The Orchadian

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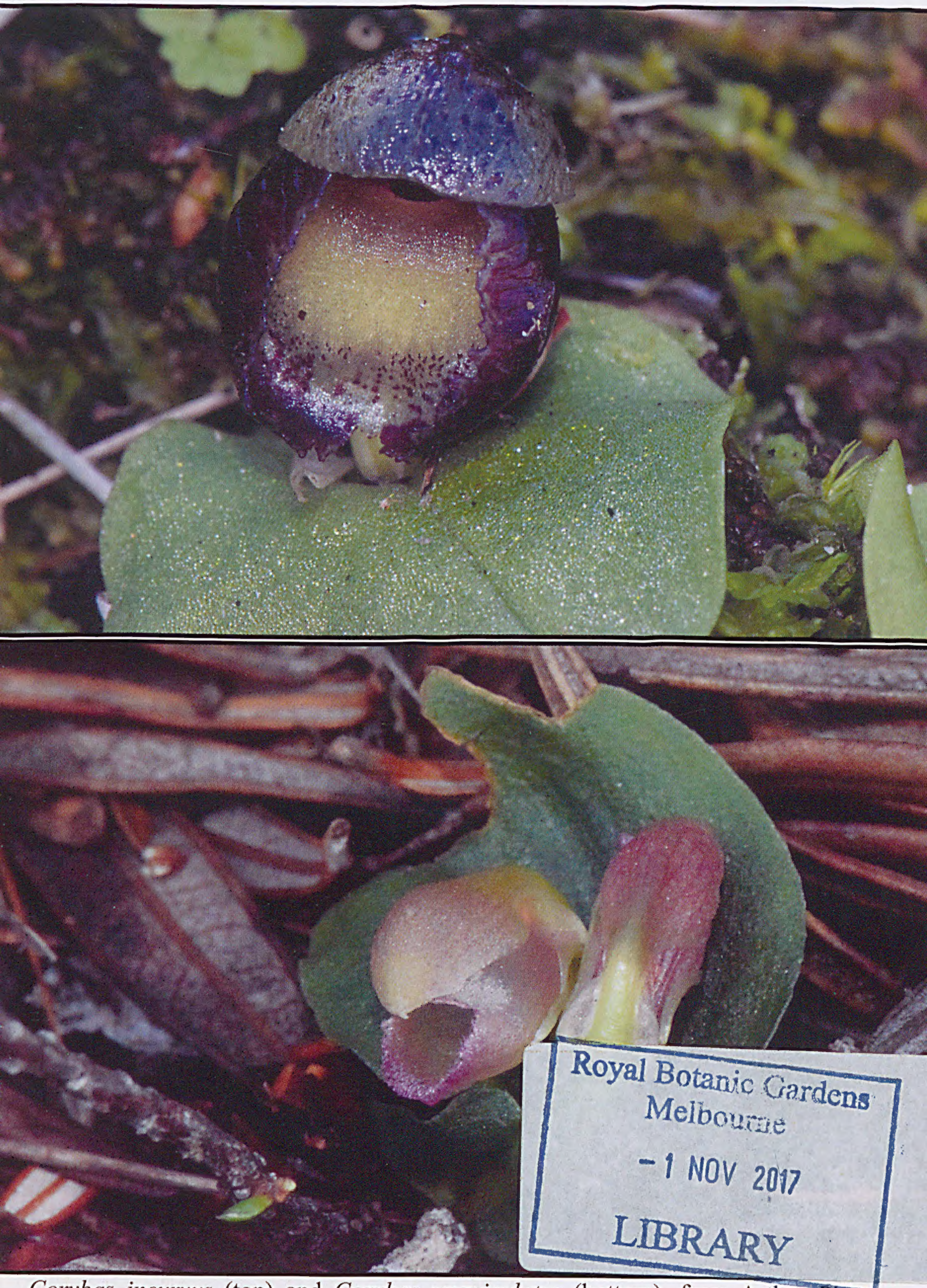
Official Journal of the Australasian Native Orchid Society Inc.



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Corybas incurvus (top) and *Corybas unguiculatus* (bottom), from Arthur Pieman

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Den. speciosum var. *curvicaule* 'Clair de Lune' (Daylight Moon' x self) FCC-ACC/ ANOS 2017, see page 44. Photo: Malcolm McGowan

Editorial

Tasmania is a national treasure trove of history, plants, animals, land forms and geology. There are more than 212 orchids, all seasonal terrestrials except for *Dendrobium striolatum* and *Sarcochilus australis*. Many are endemic, some (68 listed) threatened or rare offered some protection by the Threatened Species Protection Act 1995. About 60 orchid species were described up until 1850. There were 195 described by 1995 when *The Orchids of Tasmania* was published by David Jones, Hans Wapstra, Peter Tonelli and Stephen Harris. It is a classic book that is now expensive and very difficult to obtain. Most of the work was done by enthusiastic amateur naturalists and this is continuing.

In this issue three significant contributions present new information related to discovery and conservation. Craig Broadfield *et. al.* reports new colour forms of the winter flowering *Corybas unguiculatus* from the Arthur Pieman Conservation Area on the wild western coast of Tasmania. The area has more than 80 terrestrial orchid species, mainly visited in spring and summer, which may explain why these forms have not been previously reported. They are at least as locally common as the usual deep purple form, and predominate in some areas.

Corybas are naturally short ground hugging plants and the extreme west coast conditions here promote miniaturization of all plants. The mallee form peppermint *Eucalyptus nitida* grows to 2 m compared to 5 m in woodland a few kilometres away, for example.

Phil Collier and Robin Garnett took on the challenge of managing a covenanted private protected area contained 57 or more terrestrial orchids, seven threatened species and one found only at this site. This is an example of practical conservation with experimentation and protocols requiring a heavy time commitment.

Gastrodia is a widespread genus used in Chinese medicine. Some species can grow well in exotic gardens, but they cannot be cultivated in pots. I record the first results of a long term and ongoing study of a large colony of *G. procera* which appeared for the first time in 20 years from large tubers under an exotic tree in 2010.

Dendrobium Elegant Heart is a parent bred by Walter Upton and registered in 1986, that has produced many successful hybrids, and Callyn Farrell has produced an article on the topic. Plants do very well in New South Wales and southern Queensland and if kept dry in winter and with protection from cold extremes they can flower fairly well in Victoria.

The Kempsey Speciosum Spectacular highlights are reported from another outstanding successful event and flowering season.

Mark Nawatchko has focussed on producing tropical primary hybrids and comparing them with those found in the wild. The results may provide early insights into the nature of these plants and the inheritance of colour and other characteristics. He will later offer a comparison of crosses and reverse crosses.

Some significant ANOS awards have been granted this year and comments about them, now a responsibility of State judging panels, are presented where they have been made available.

Readers will note that another volume of The Orchadian has begun. There will continue to be a mixture of articles on a variety of topics, and those as in this issue with significant new information should provide evidence and discussion to support conclusions. Reports and discussion of new taxa and variations, and new techniques are welcome. I thank the peer reviewers contributing to this issue, and Keith Riseley for his invaluable assistance in production.

Peter Adams

President's Report for Annual General Meeting August 2017

It has been 12 months since I was elected President of ANOS Inc. In that time Council has been working diligently and I thank them for their teamwork and positive results. Issues that council identified at the beginning of this term requiring action included upgrading of the website, considering how we can best address our aim of promoting and supporting conservation issues, improving communication with groups and members, increasing membership, updating the judging handbook, and exploring options for the challenging task of organising the national conference and show in 2019.

Rick Winch as Secretary has supported the work of council in a dedicated and reliable manner and David Brewster as Treasurer has worked steadily managing our finances. Dave Groffen has provided leadership as National Judging Registrar.

The Orchadian editor, Peter Adams, has been dedicated to upgrading the quality of our journal, a very large commitment, and the results can be seen in an expanding base of writers and rising memberships. An index of past issues is currently being placed online for convenience of members, and scanning of early editions is also planned to make it more accessible to growers and researchers. It is a rich source of new information and Australian orchid history.

A new website has been established by Malcolm McGowan that allows easy online registration and renewal of membership. It provides information on all awards, and the capacity to search for awards and hybrid registration, a huge task undertaken by Keith Riseley. Further expansion of the website is occurring. *The Orchadian* Facegroup page has been initiated and maintained by Callyn Farrell. Malcolm has also initiated our e-Newsletter as a way of communicating more informally between each other regarding contemporary matters such as shows, special events, and council news.

The Conservation Officer Roslyn Capell has been familiarising herself with nationwide conservation issues and liaising with a number of conservation groups. Some of her work has been seen in articles in *The Orchadian*. David James as Membership Officer has spent many hours in updating our membership list and providing support for membership enquiries. Barry Dudman and Wal Heath as councillors have provided perspectives and opinions from Tasmania and Western Australia respectively. Tony Clarke as Past President has provided support and counsel.

I thank the Ira Butler Trophy Committee for their work in promoting the recognition of quality ANOS species and hybrids and welcome the new President Rob Trevenor. Alan Stephenson has retired after his three year term. Thanks to him and to the secretary Irene Chalmers for their work.

Organisations must be flexible and be prepared to change when circumstances require it. The increasing average age of our membership and societal changes mean that ANOS Inc. must also consider its role and function. More people obtain their information online, less people go to formal orchid meetings, and there is increasing interest amongst members, particularly younger ones, for field excursions and support of conservation, particularly of terrestrial orchids. After careful consideration of member needs Council have decided that *The Orchadian* will remain as a hard copy journal but this will be under continuing review.

The capacity and willingness for individual groups to sponsor and deliver a triennial conference and show is increasingly limited. Thanks are due to the ANOS Central Coast and Kempsey Speciosum Spectacular organisers for providing the successful Conference and Show in 2016. In discussions with individual groups so far has no clear solution for finding a group or groups who can undertake this task have been found. Council have determined that they will undertake the responsibility of organising and funding the next triennial event themselves and welcome support and suggestions from any group or groups who may be willing to share a part of this load by providing their show as a starting point. We also welcome new ideas about how to deliver a conference and show for members and the public.

I have spoken individually to a number of groups and will continue to talk to members about the function of ANOS Inc. so we can remain a meaningful and productive organisation fulfilling our charter.

Sheryl Lawson

Corybas unguiculatus (R.Br.) Rchb.f. (Orchidoideae): New colour forms in the Arthur Pieman Conservation Area, North-West Tasmania

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Summary

Two new colour forms for *Corybas unguiculatus* (small helmet orchid), yellow-green and pink, were discovered by Craig Broadfield in July 2017 on the North-West coast of Tasmania. They are scattered or in small loose groups and are more locally common than the usual dark purple form. Measurement of leaves, flowers and floral parts show that the morphology is essentially the same in the new colour forms, although the pedicel may be a little shorter in the lighter colour forms. Flower dissection and principal coordinate analysis of the morphological data confirm that the colour forms belong to a single taxon, *Corybas unguiculatus*.

Introduction

The genus *Corybas* Salisb. (helmet orchids) is large, with more than 100 species from Macquarie Island in the south to Australia, Indonesia, southeast Asia, China, and the Himalayas. The genus was established in 1807, based on the type species *C. aconitiflorus*, collected originally from the Sydney area. There are at least seven species in Tasmania and they are small with a single leaf close to the ground, usually with a single flower of helmet shape.

Corybas unguiculatus is a relatively common species in Tasmania and also occurs in South Australia, Victoria, New South Wales, and Queensland. It flowers from May to August and is usually found in coastal heath and woodlands, and wet sclerophyll rainforests. In heathland it is often found growing around stumps and at the base of small eucalypts and other large shrubs. In rainforest environments it is often found on decomposing tree ferns and logs or in leaf litter. The flowers are typically single with an intense glossy dark red-purple to purple-black colour. The single leaf is up to 30 x 20 mm, rounded to ovate, greyish-green above and reddish-purple beneath and ground-hugging. Previously it was thought to have little variation in colour and form.

Wet coastal heathland (Fig. 1) is scattered over the Arthur Pieman Conservation Area (APCA) with a dense concentration of several subtypes to the north of the Arthur River (Kirkpatrick & Harris 1999). The study area is within 2 km of the coast on elevated low hills with quartzite outcrops. It is dominated by sparsely scattered mallee peppermint *Eucalyptus nitida* (known locally as Smithton peppermint), medium and short coastal heathland sclerophyll shrubs including *Leptospermum scoparium*, *Banksia marginata*, *Epacris impressa*, *Allocasuarina*, and in wetter areas with the tufted monocotyledons *Gahnia grandis*, *Juncus* spp., *Lepidosperma*, *Lomandra* and lichens, mosses and ferns.

The area is orchid-rich with a succession of species flowering throughout most of the year. The orchids flowering and developing at the same time as *C. unguiculatus* included *C. incurvus*, *C. aconitiflorus*, *Cyrtostylis exertus*, *Cyrtostylis reniformis*, *Pterostylis tasmanica*, *P. nana*, *Caladenia major*, *Caladenia caudata* and *Thelymitra* species. Some *Pyrorchis nigricans* were in bud.

Site Details

The part of the northern end of the APCA where the *C. unguiculatus* forms occur consists of predominantly highly metamorphosed sedimentary geology. Bright quartzite forms numerous rocky outcrops and the area is strewn with this material which erodes to form a sandy soil, often forming pockets in the rocky outcrops. The higher ground is relatively well drained, while soil in depressions remains wet for much of the year. The high ground becomes very dry at times of low rainfall, however the average annual rainfall is over 1000 mm. The site is exposed to westerly winds which arrive via the Southern Ocean, which is visible and audible from the site. The vigour of the vegetation is restricted by the lack of soil depth in many areas and its relative nutritional quality. Most of the *C. unguiculatus* plants were situated in moderately

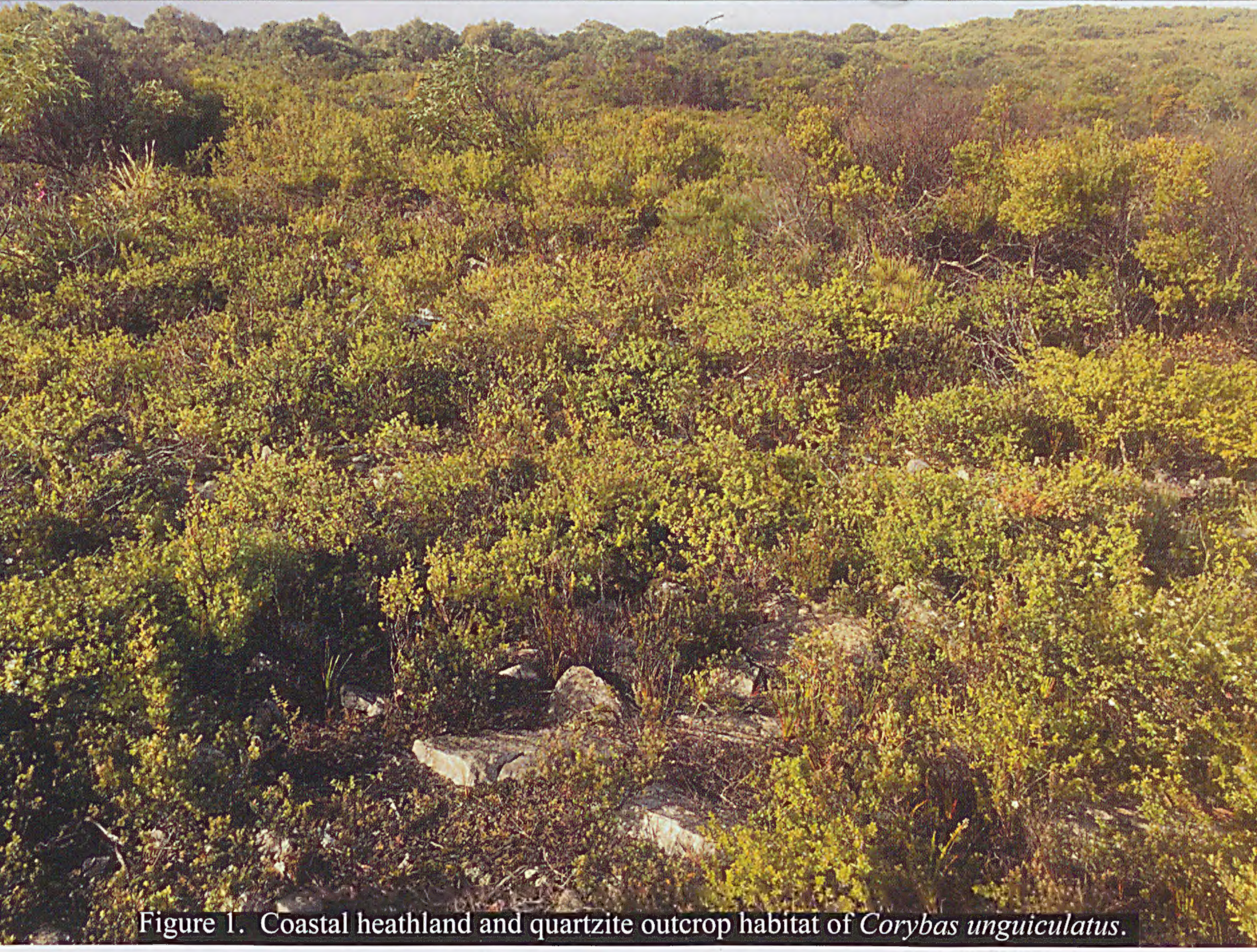

Figure 1. Coastal heathland and quartzite outcrop habitat of *Corybas unguiculatus*.

elevated well-drained parts of the heathland, with none seen on the highest stony ground and few in the wetter depressions

Findings

An area approximately 1000 m^2 was surveyed by Craig Broadfield (C.B.) over several weeks with 190 GPS-recorded groups of *C. unguiculatus*. The different colour forms are illustrated in Figs. 2–9.

Deep purple form

Approximately 450 individuals were located, scattered amongst and often found near other colour forms. The undersides of many of the leaves were pure green, unlike the red coloured undersides typical in other places. There was little variation seen in the size or form of these plants. One double-headed flowering plant was located.

Yellow-green form

One hundred and sixty-one plants were recorded, including seven with double-headed flowers. This colour form was scattered, sometimes in groups or mixed with other colours. Some flowers were more elongated than in the deep purple form. The undersides of the leaves were pure green, or sometimes greyish-green. Pedicels were often shorter than in the deep purple form.

Pink form

Eight hundred and ninety-five (895) plants were recorded including 18 with double-headed flowers. As with the yellow-green form, some flowers were more elongated than the deep purple form. The undersides of the leaves were pure green, and the veins were very prominent in some. The pedicels were short as for the yellow-green forms.

On close inspection, there were variations in the intensity of green-yellow and pink in different plants, and some had flowers that showed some pink and yellow-green on the dorsal sepal and sometimes on the tubular part of the flower. Overall, in the yellow-green and pink forms, the leaf size varied greatly from 5–42 mm, with larger leaves prominently veined on the lower side.

The scattered pattern of distribution of these colour forms and combinations of them at various points in the total area of the patch indicates that they are seedlings. There were no close groups to suggest

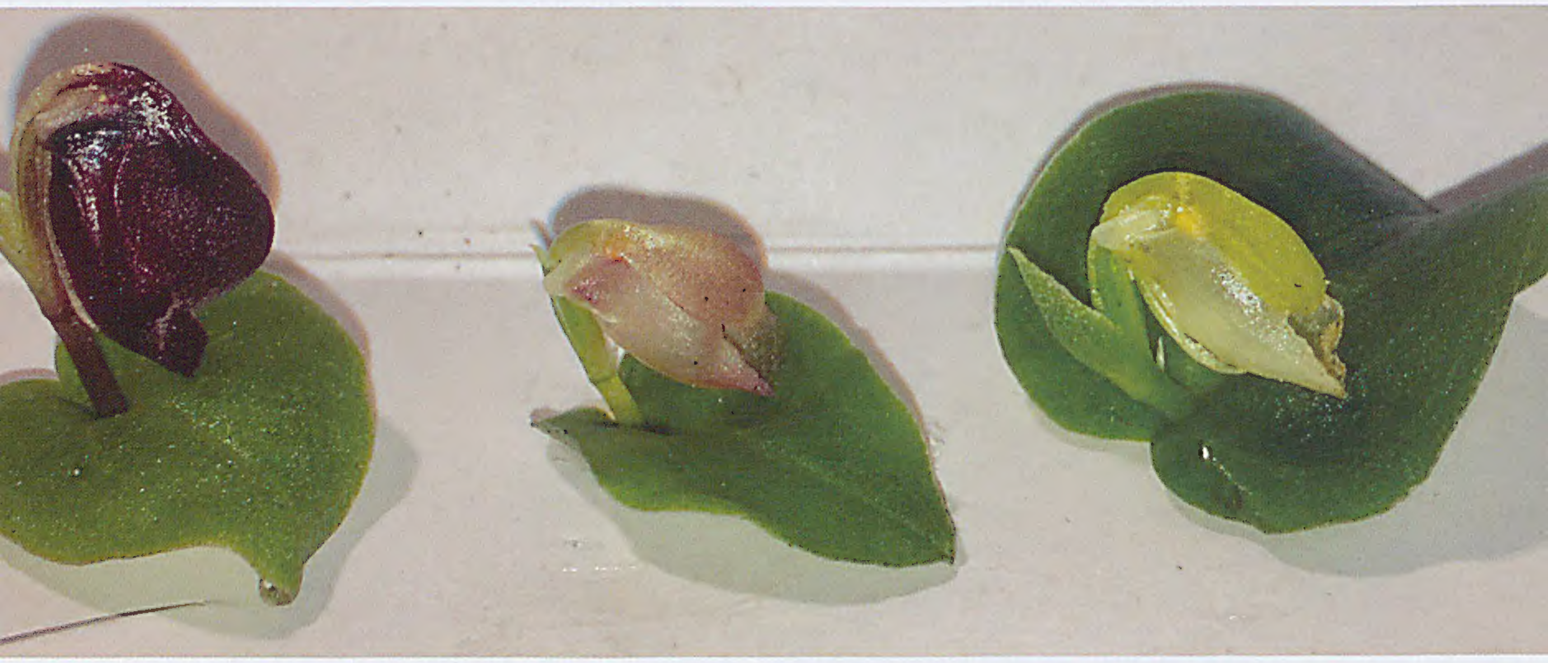

Figure 2a. Three *Corybas unguiculatus* colour forms.

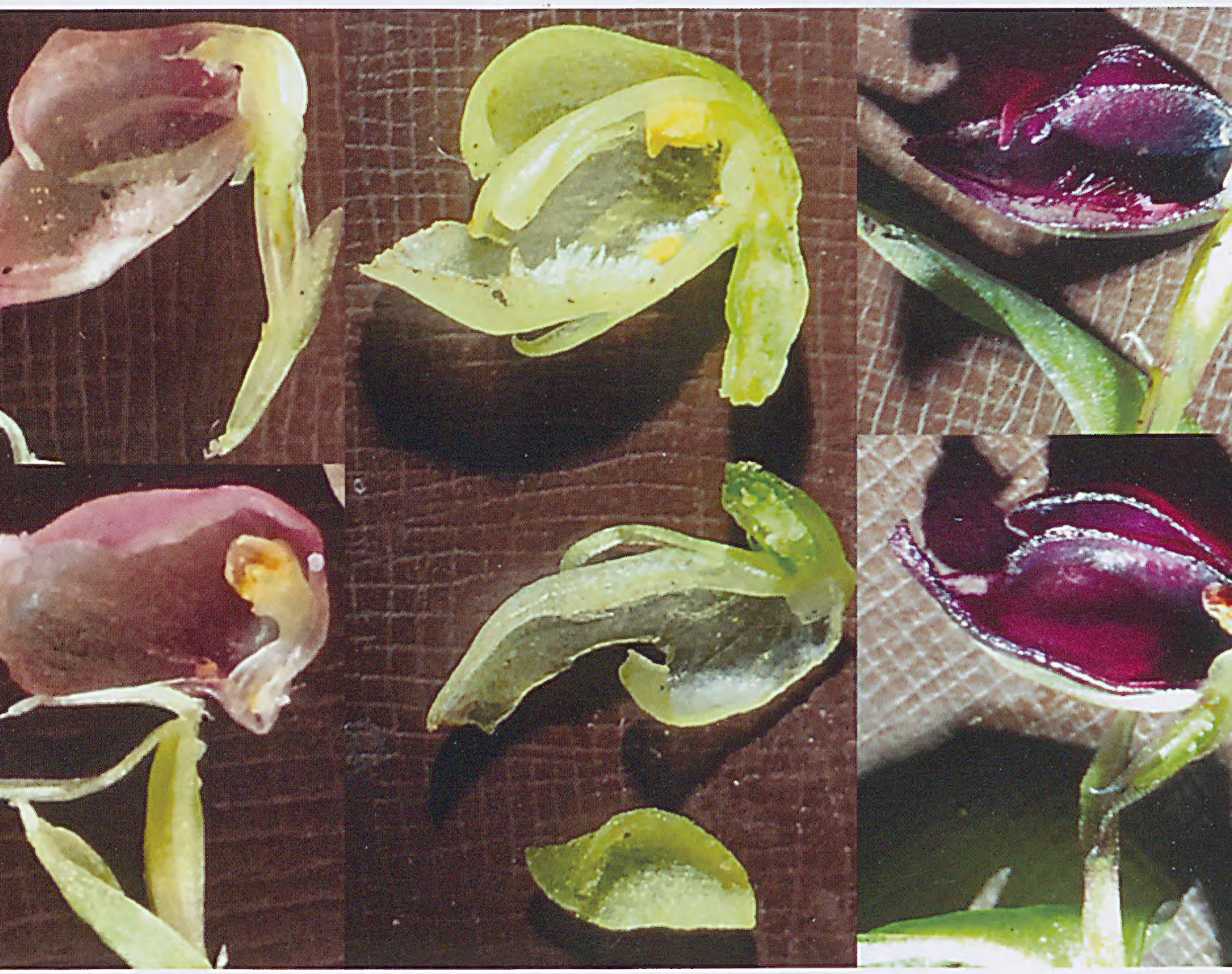

Figure 2b. Dissection of *Corybas unguiculatus* colour forms, photos P. Adams

colonies reproducing vegetatively. Overall the percentage of flowering plants was high (approx. 80%). Double headed flowers made up almost 4% of the combined yellow-green & pink populations and were scattered over the area in no discernible pattern.

There was a concentration of pink specimens in a specific area, which dwindled moving outwards from the epicentre of the patch. This was confirmed when the GPS way-points were plotted as per the site plan (Fig. 10). We also surveyed a large area of surrounding prospective country north and south of the Arthur River which proved unproductive in finding any *C. unguiculatus*.

Flowering time

The initial discovery by CB of the two variants was on 2nd July 2017. Observations suggested that this was perhaps two weeks into the flowering period as no spent flowers were observed. Four subsequent site visits were made until August 10th, by which time no green-yellow variants were still flowering and a very small number of pink flowered plants. At this later date, purple-red was the most plentiful of the three colours, however still in low numbers. It was noted at the time of the last visit that many groups of plants which had flowered earlier and had well developed seed capsules were accompanied by plants in early bud stage which would flower in the next 3–5 weeks. This second phase flowering appears to be highly unusual for the species. Over the years, the first author has observed the genus to have a staggered flowering season rather than a distinct second flush of flowers.

Flower Dissection

All three colour forms were cut in longitudinal section to compare floral structures. There was no significant difference in the dorsal sepal 'helmet' and labellum. Generally, the flowers have a leafy bract which varies in length and there is a smaller floral bract opposite the main one in an anterior position. The bract is clearly illustrated in Curtis (1979) but not in Jones (2006). The petals and sepals are flat and filiform, spreading below and at the sites of the column. The size of the anterior floral bract of the purple form is smaller, on average, than the pink and yellow-green colour forms (Table 1).

Midline calli on the labellum are clear to white on the pink and yellow-green forms and they are reddish in the purple form. In the purple form, the flower pedicel is about 20 mm long, raising the flower well above the leaf. In the other colour forms the flowers are on a much shorter pedicel and some appear to sit on the leaf or just above it.

Measurements and Analysis

The major morphological features were measured and recorded for 15 plants of each colour form (Table 1). Leaf petiole length was omitted because the petiole runs into the ground and cannot be studied without damage. Means and ranges for 17 characters are presented for 14–15 plants of each colour form. Most parameters were similar except for colour features, ovary length and stem height to ovary, which were often shorter in the new colour forms. The similarity of most characters across the colour range is evident and the ranges overlap in all colours. Flower dimensions are very similar for all plants, but there were variations in shape and some parameters, hence we proceeded to numerical analysis to investigate the possibility of sub-taxa.

Principal Coordinate Analysis (PCoA) is a numerical technique to compare similarity of populations of plants, one plant with every other plant. The plant measurement data was imported to PC-ORD for PCoA analysis using a correlation matrix Figures 11–13 show the ordination of the three colour forms in three different axes presented at 90° to each other. If distinct groups are formed this can indicate separate taxa. There is overlap of the colour forms in all axes, indicating a single group and taxon, *C. unguiculatus* and there are no different taxa.

Discussion

This report is apparently the first for pink and yellow-green colour forms and for double headed flowering in *C. unguiculatus*. At an early stage of surveying, this appeared to be an isolated occurrence, perhaps overlooked previously because the west coast is not so attractive to visitors in mid-winter, with wet stormy weather and very high winds. Green forms of *C. incurvus*, *C. fimbriatus* and *C. diemenicus* have been recorded (P. Tonelli pers. comm.). Multiple flowering in the genus *Corybas* is very rare in Australia. This site also produced two double-headed *C. aconitiflorus* this season. It is difficult to come up with details relating to the occurrence of double headed flowering plants in *C. unguiculatus*,

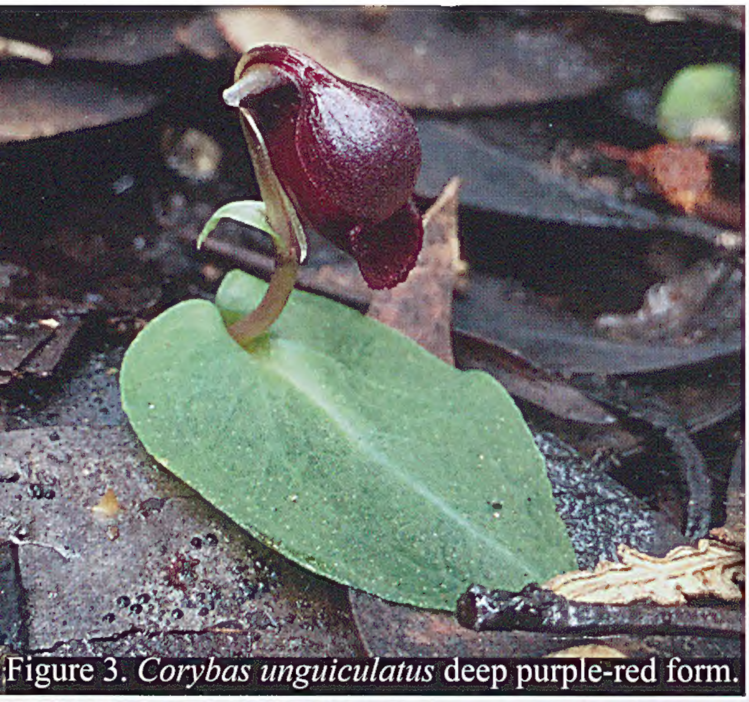
Figure 3. *Corybas unguiculatus* deep purple-red form.

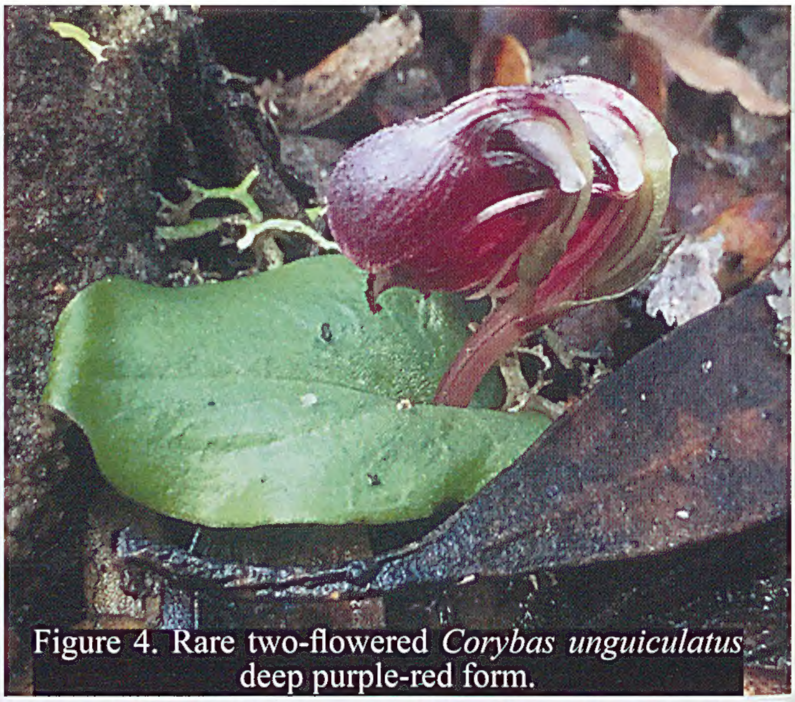
Figure 4. Rare two-flowered *Corybas unguiculatus* deep purple-red form.

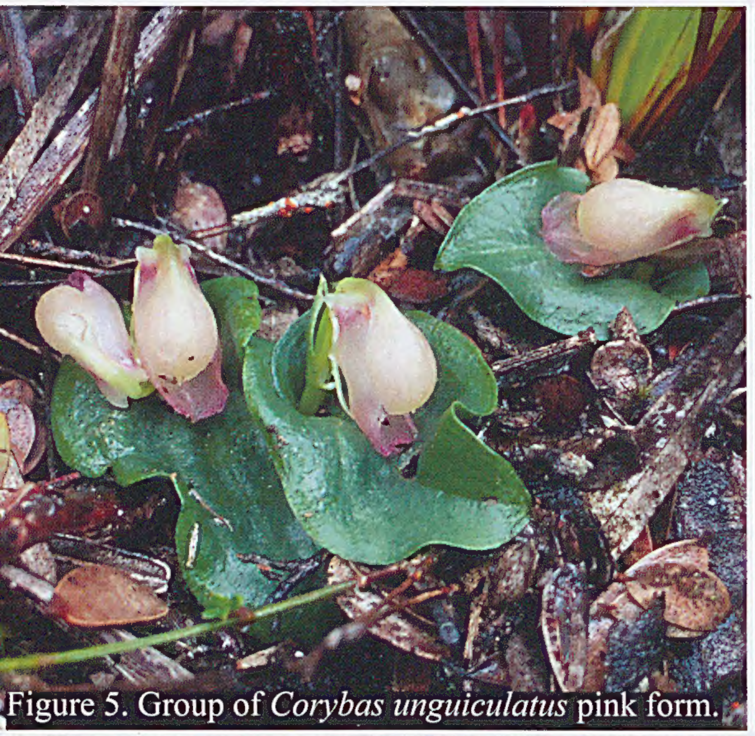
Figure 5. Group of *Corybas unguiculatus* pink form.

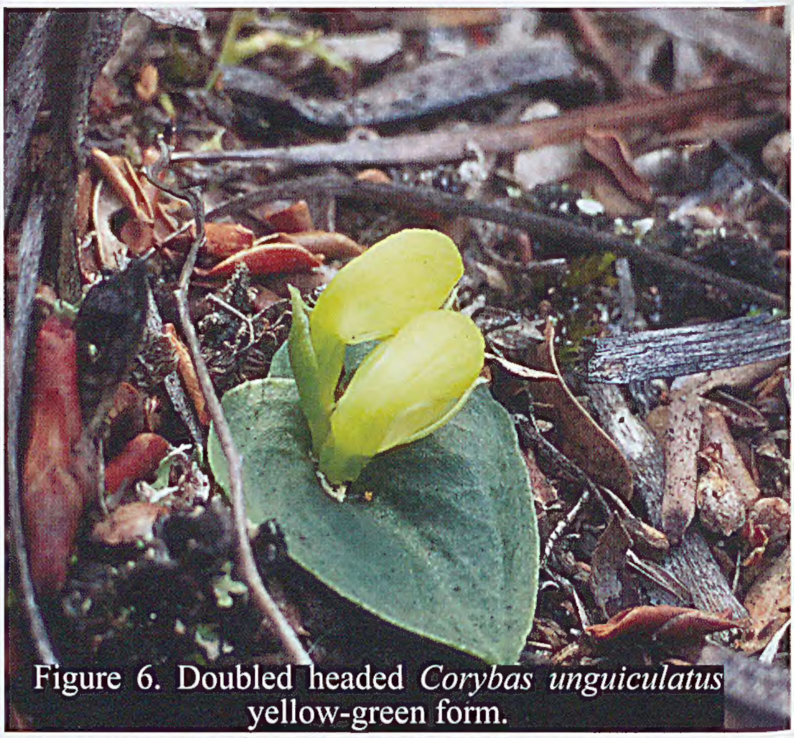
Figure 6. Doubled headed *Corybas unguiculatus* yellow-green form.

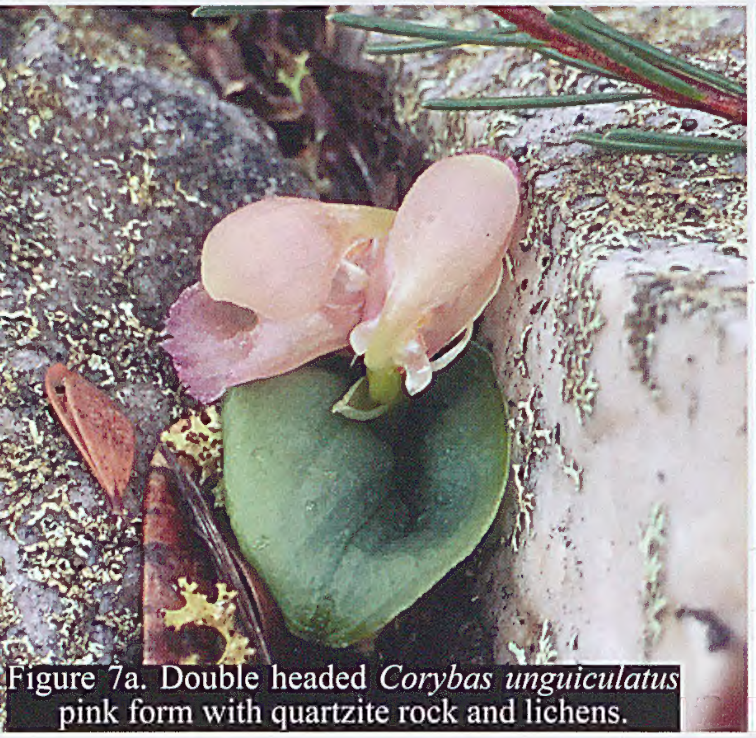
Figure 7a. Double headed *Corybas unguiculatus* pink form with quartzite rock and lichens.

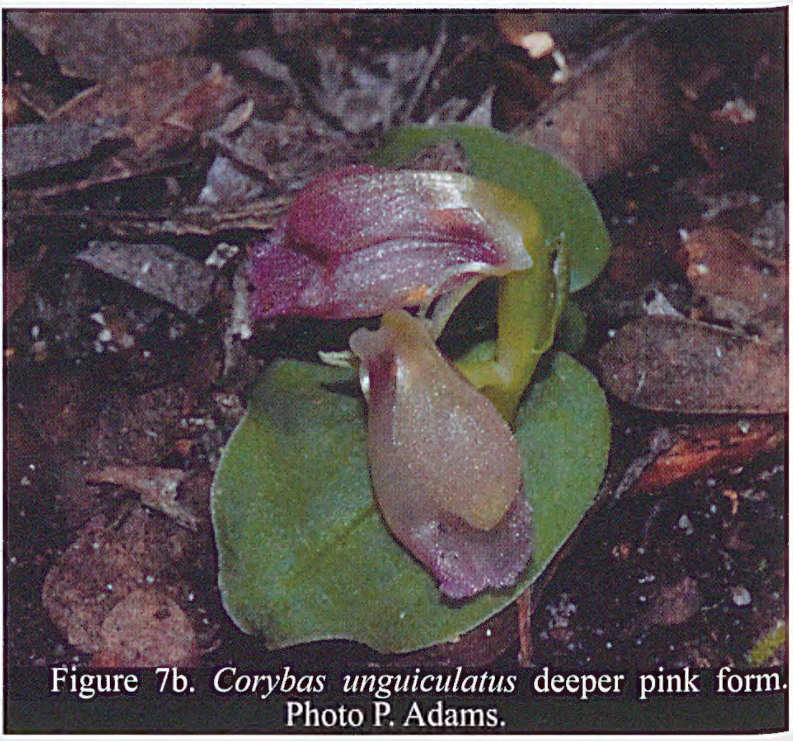
Figure 7b. *Corybas unguiculatus* deeper pink form. Photo P. Adams.

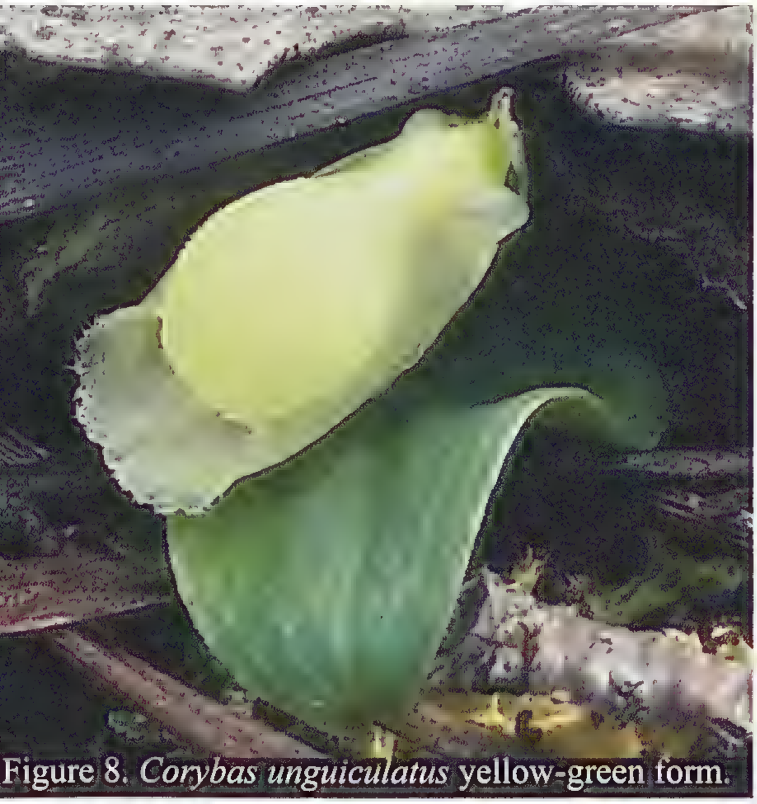

Figure 8. *Corybas unguiculatus* yellow-green form.

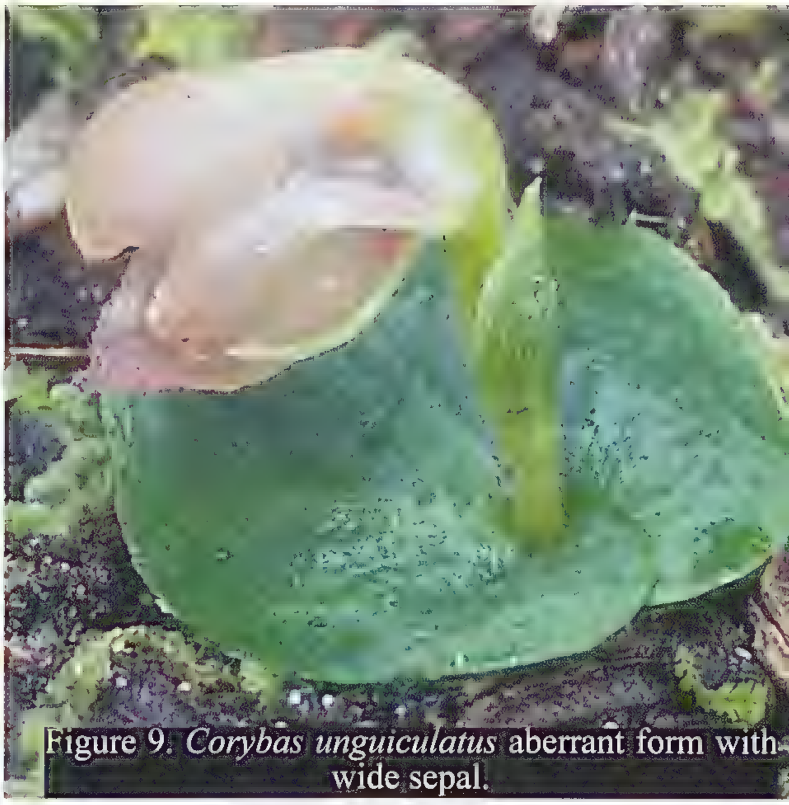

Figure 9. *Corybas unguiculatus* aberrant form with wide sepal.

and there are few seasoned orchid hunters who have sighted one such specimen in a lifetime. A three-flowered specimen was apparently recorded during a Victorian ANOS field trip some years ago. The frequency of double-headed flowering plants at this location is astonishingly high at 4% in this first season of data collection. The cause of this high percentage cannot be easily explained.

Colour variations arise from different combinations of purple-red xanthophyll pigments and yellow-orange carotenoids, together with green chlorophyll. Colour inheritance in orchids is complex and involves many genes. In these new colour variants, it is likely that there is a change in genetic expression or dosage of the usually dominant purple xanthophylls which allows the yellow, green and pale pink colours to be seen. There are small differences in the morphology of the three colour forms, with much overlap, and the measurements and numerical analysis combined with findings of flower dissections indicate that these do not warrant forming sub-taxa, and can be regarded as variation in the species.

All three species of *Calochilus* found in the APCA are regularly found with paler colour variations. A pale green *Caladenia dienema* is also recorded from the APCA. It would appear that colour suppression has extended to the underside of the leaves of the *C. unguiculatus* colour variants at the APCA, as all have been found to have green undersides. Leaf size varies greatly from 5–42 mm. Larger leaves are prominently veined on the underside.

The APCA is no stranger to new discoveries. In 2016 a new and extensive population of the threatened species *Pterostylis cucullata subsp. cucullata* was located by C.B. just metres from the main road. The winter 2017 orchid season had a great start with this new discovery while on a general orchid trip with no target species in mind.

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Acknowledgements

Photos by Craig Braodfield except where otherwise indicated.

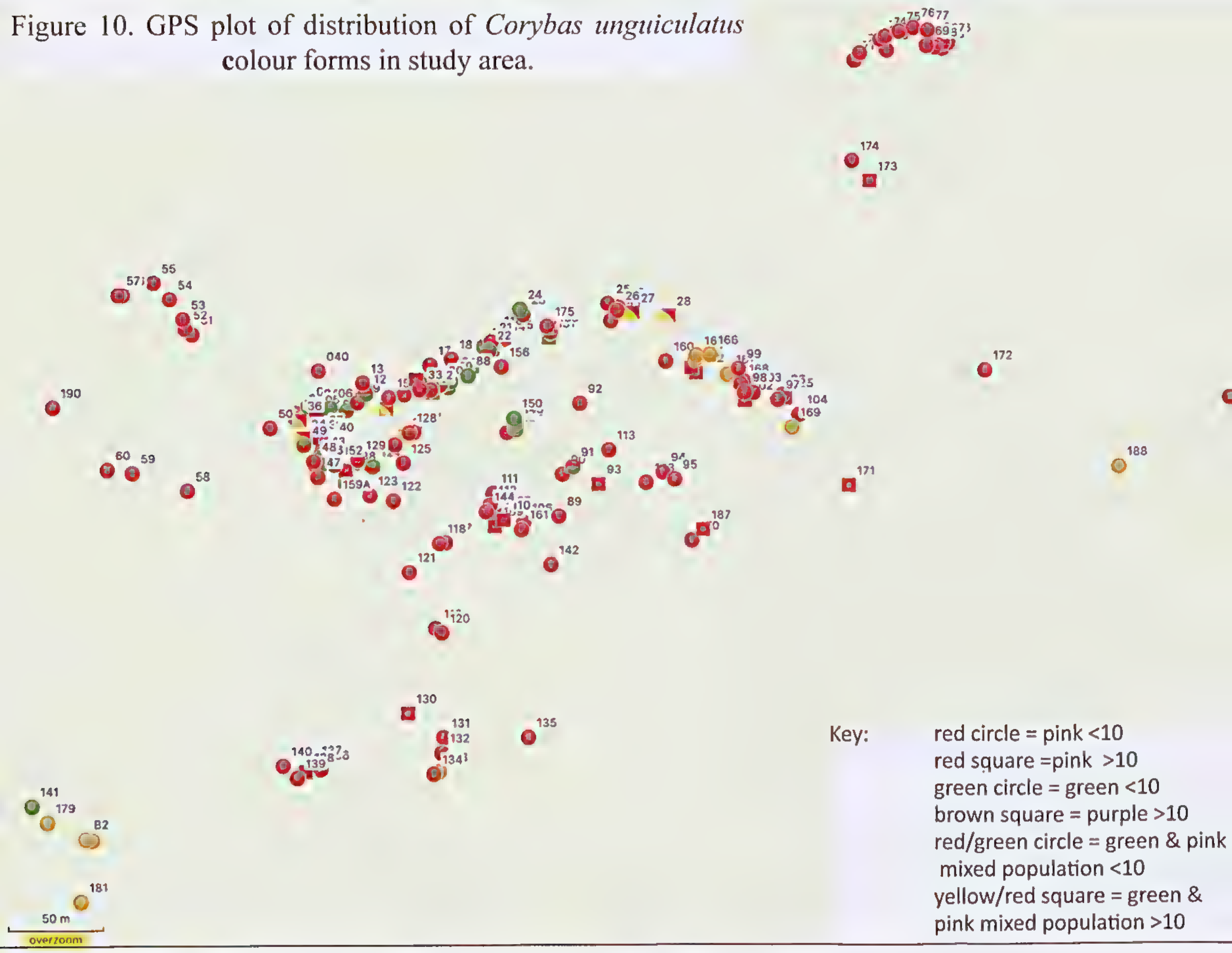
Thanks to Thomas and Nicholas Broadfield and Robert Clark who assisted with the survey work. David Adams performed the PCoA analysis.

Craig Broadfield is a Trade Certificate Horticulturalist, former TAFE teacher and dedicated citizen scientist with a life-long interest in Tasmanian orchids.

Table 1. Morphological characters including mean values and ranges of colour forms of *Corybas unguiculatus.*

MORPHOLOGICAL CHARACTER measurements in mm	Purple/Red (average)	Green/Yellow (average)	Pink (average)
Leaf Length	7-23 (15.6)	9-24 (14)	12-24 (17.2)
Leaf Width	5-17.5 (11.8)	5-19 (10.6)	9.5-17 (12.3)
Leaf Undercolour	6.7% with red tint	100% green	100% green
Pedicel Tint	7.1% green	100% green	100% green
Pedicel Height to Ovary	2.5-7 (4.5)	2-3 (2.4)	2-4 (3.2)
Ovary Length	5.5-11 (7.6)	4.5-7 (5.6)	5-7 (6.2)
Total Height	10-18 (14.1)	10-14 (11.3)	10-14 (12)
Anterior Floral Bract Length	0.5-3 (1)	0.5-2 (1.3)	1.5-2 (1.9)
Bract Colour	13.3% green	100% green	100% green
Bract Length	4-8 (5.9)	5-8 (6.2)	6-8 (6.8)
Bract Width	1-3 (1.9)	1.5-3 (2.1)	1.5-3 (2.1)
Flower Length	10-13.5 (12)	10-12 (11.1)	10.5-14 (11.9)
Flower Width	3.5-6 (5.2)	4.5-5.5 (5)	4-6 (5)
Lateral Sepal Length	6-9 (7.2)	5-6.5 (6)	4-7 (6)
Dorsal Sepal Length	8-11 (9.4)	7.5-9.5 (8.2)	7-11 (9.3)
Dorsal Sepal Width	3.5-6 (4.8)	3-4.5 (3.8)	3.5-5 (4.1)
Petal Length	2.5-6 (4)	3-6.5 (4.9)	3-6 (4.8)
Labellum Length	10-13.5 (12)	10-12 (11.1)	10.5-14 (11.9)
Labellum Width	4-6 (5.2)	4.5-5.5 (5)	4.5-6 (5)
Labellum Apperture	3-5 (3.9)	3-4.5 (3.6)	2.5-5 (3.7)
Calli Colour	Red/Reddish	white/clear	white/clear

Figure 10. GPS plot of distribution of *Corybas unguiculatus* colour forms in study area.



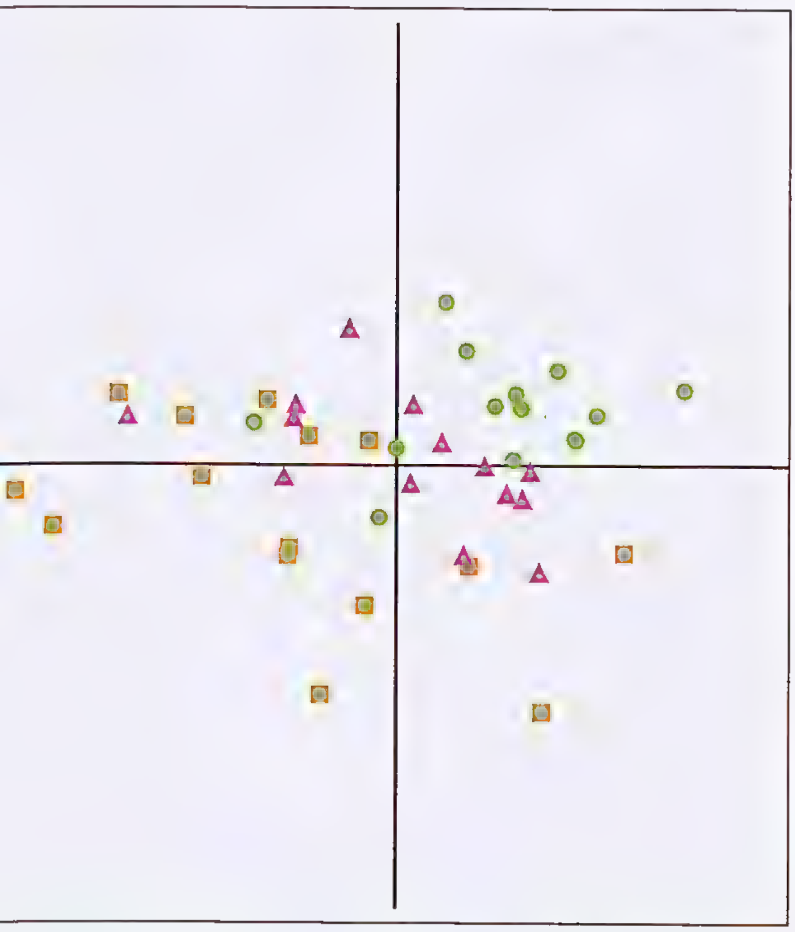


Figure 11. Principal Coordinates Analysis of colour forms, axes I and III.

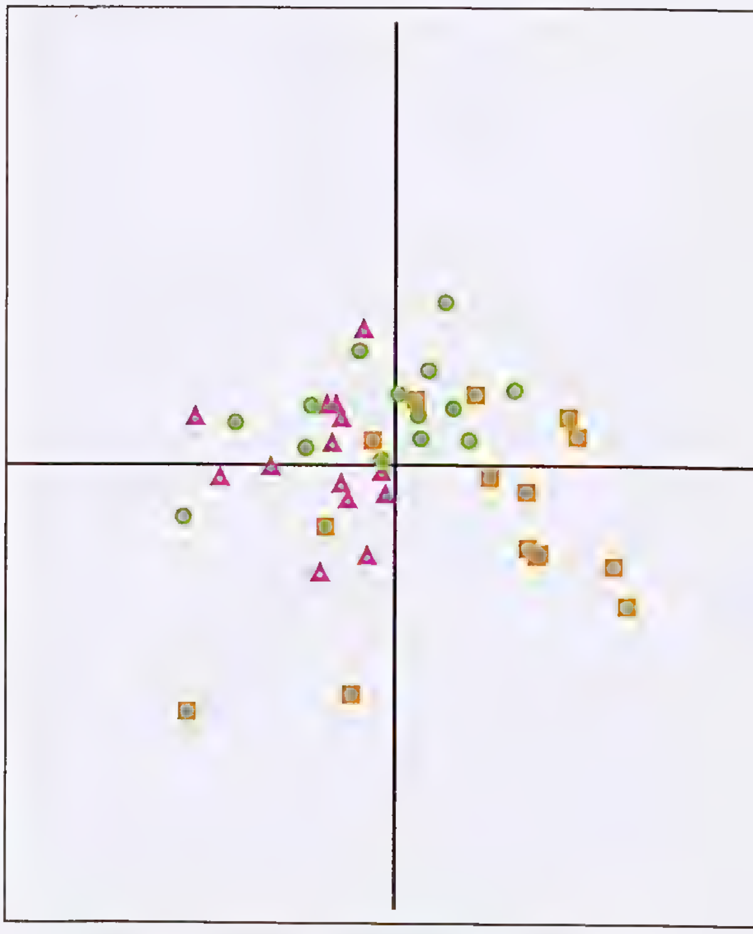


Figure 12. Principal Coordinates Analysis of colour forms, axes II and III.

Legend. brown square: purple form, pink triangle: pink form, green circle: green/yellow form

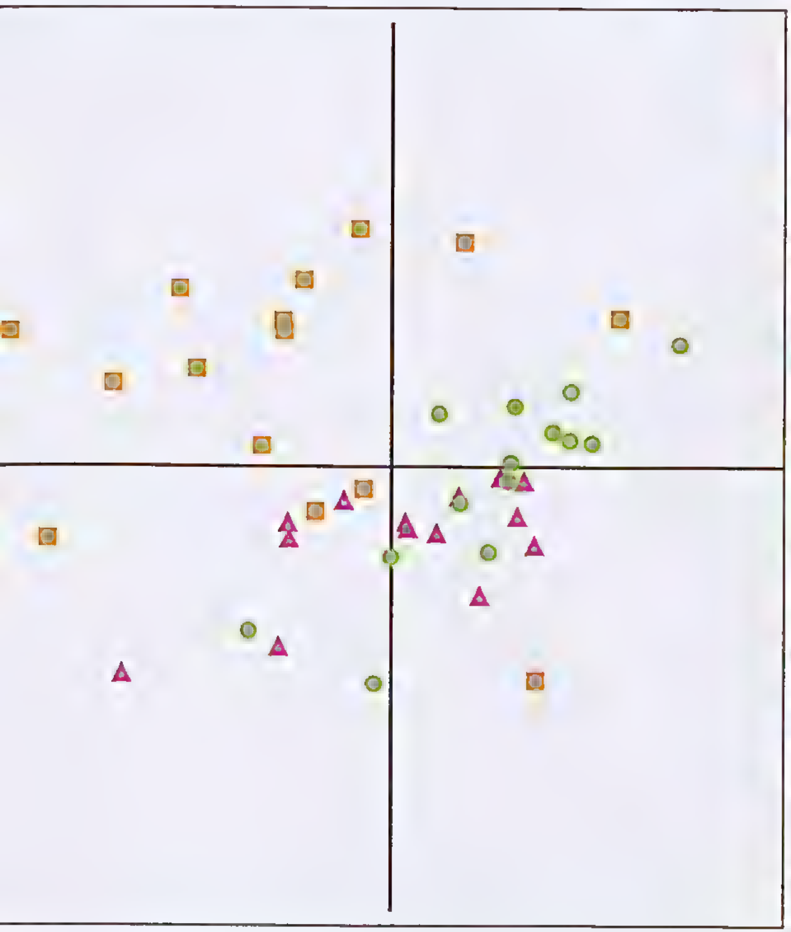


Figure 13. Principal Coordinates Analysis of colour forms, axes I and II.

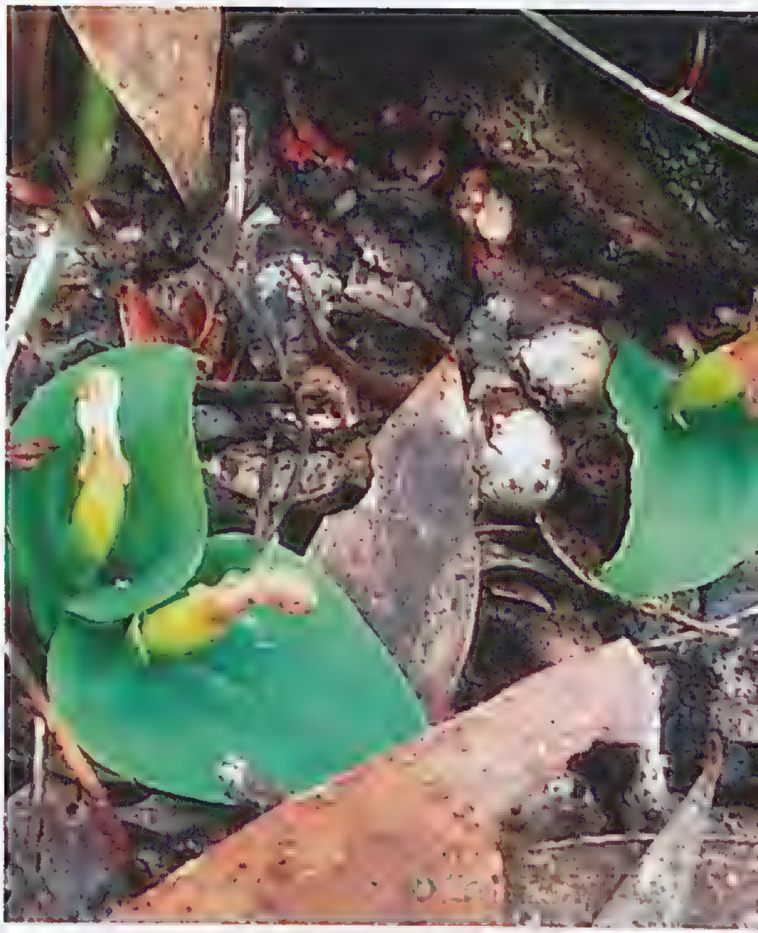


Figure 14. Developing seed capsules of *Corybas unguiculatus* Aug. 10th 2017.

Observations of *Gastrodia procera* G.W.Carr (Gastrodieae) in the Dandenong Ranges, Victoria

Text & photos Peter Adams
Research Associate, School of Biosciences, University of Melbourne and
National Herbarium, Royal Botanic Gardens, Melbourne

Summary

A large colony of *Gastrodia procera* appeared with flower stems in early October 2010 following fifty percent higher than average rainfall in the preceding nine months of the year.

The flowering history of the colony was followed and correlated with annual rainfall. Flower stems arose from the same and distant dormant tubers in 2011 in a larger flowering, and a large number of flowering size tubers seen at point excavations were apparently dormant for many years. Insect exclusion experiments showed that the flowers are self pollinating, and dissection of developing flowers indicated that pollinia disintegrate onto the stigma before flowers open, leading to a very rapid conversion of flowers to seed capsules.

Introduction

Orchidaceae depend on fungi for seed germination and for nutrition. Most orchids have chlorophyll providing a photosynthetic pathway to produce sugars, but true obligate mycoheterotrophs such as *Gastrodia* have no chlorophyll and rely entirely on fungi throughout their life cycle. There are a number of other Australian species in the genera *Dipodium*, *Epipogium*, *Erythrorchis* and *Didymoplexus* that are also obligate mycoheterotrophs. The cosmopolitan genus *Gastrodia* has around 70 species (WCSP 2015) in Australia, eastern Sibera, Japan, Malesia, New Zealand, Madagascar and islands of the Pacific and Indian oceans. They are known locally as 'potato orchids' on account of their large fleshy brown tubers. There are seven Australian species (Jones 2006) and five species in New Zealand (Lehnebach 2016). *Gastrodia sesamoides* is the only shared species. They have flowers that are often very similar, and there are variable reports of insect and self pollination.

There are two species of *Gastrodia* in the Dandenong ranges near Melbourne, *G. sesamoides* (cinnamon bells) and *G. procera* (tall potato orchid). They are both leafless and have dark purple-black stems. The *G. procera* colony studied was first noted in flower in September 2010 at Mount Evelyn at 300 m altitude. *Gastrodia procera* was described by G. Carr (1991) from a collection made in the Dandenong Ranges, near the junction of Olinda and Stonyford creeks higher up the same range as in this study. It is more robust and taller than *G. sesamoides*, with stems up to 1.2 m which are erect when in bud and do not reflex at any stage. The flowers are also larger, about 2 cm long with a richer brown exterior and develop larger pale brown seed capsules. The species is also found in New South Wales north to Barrington Tops at 200–800 m and south in Tasmania. The flowers are tubular, pale to mid-brown with white free tepal margins. The labellum is strongly fringed with orange calli. Some of this coloured labellar material has been described as pseudo-pollen, considered to be collected by insects (Jones 2006). *Gastrodia procera* prefers deep litter in wet forests such as *Eucalyptus regnans* F.Muell. in the higher Dandenong Ranges, and wet sclerophyll forests of *E. obliqua* L'Hér and *E. baxteri* (Benth.) Maiden & Blakely ex J.M.Black around Mount Evelyn. It can be found sporadically in gardens in this and other areas. Flowering is erratic over years and plants are scattered in bushland around Mt. Evelyn singly or in groups of two or three. There may be larger groups in other parts of the Dandenongs.

In September 2010, 17 *G. procera* plants emerged in a 10 x 6 m area and developed into tall plants which flowered about two months later. They were growing under a large introduced *Cedrus deodora* (Roxb. ex D.Don) G.Don) (Indian cedar) in deep pine needle and cone fragment litter, at the end of the driveway 20 m from my house, surrounded by an exotic garden. They were 20 m from the nearest *Eucalyptus* bushland. I had seen no plants under the cedar tree in the past 22 years of living there. This unusual flowering prompted a long term study of the colony to follow its flowering, investigate pollination, and attempt to answer the question of why it had flowered after so many years.

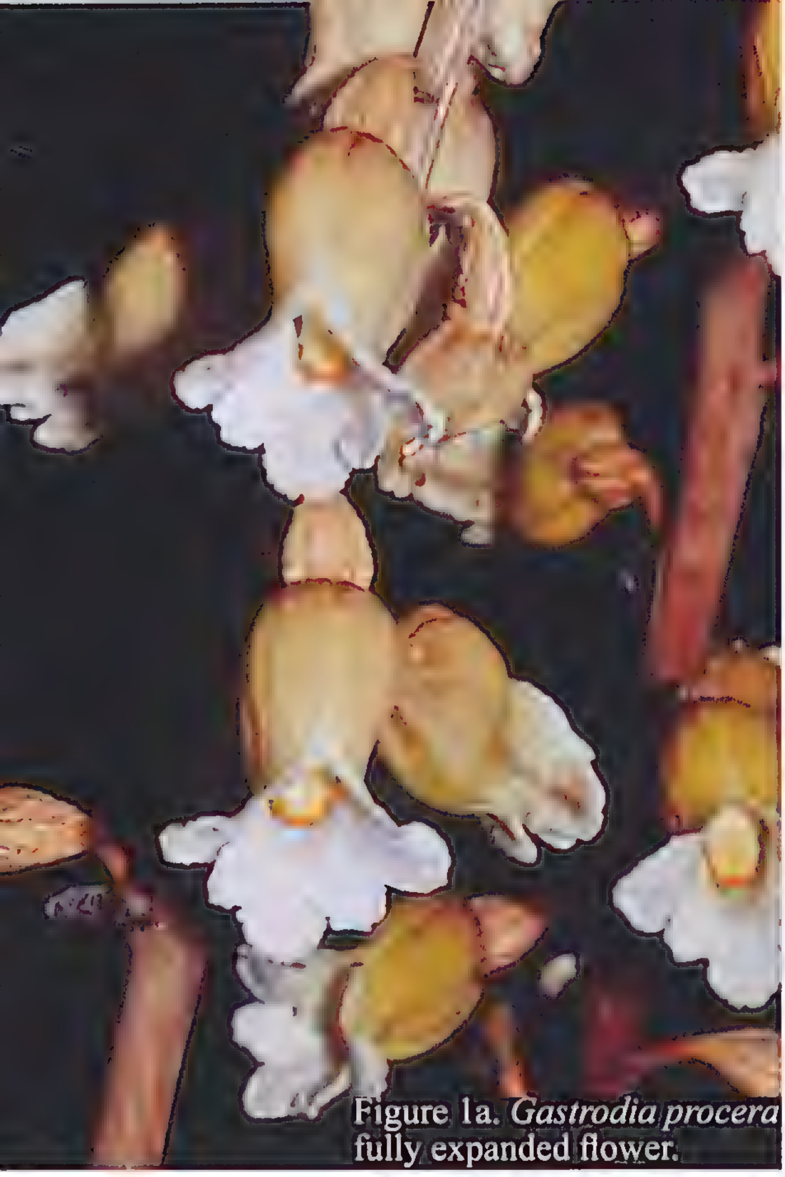


Figure 1a. *Gastrodia procera* fully expanded flower.

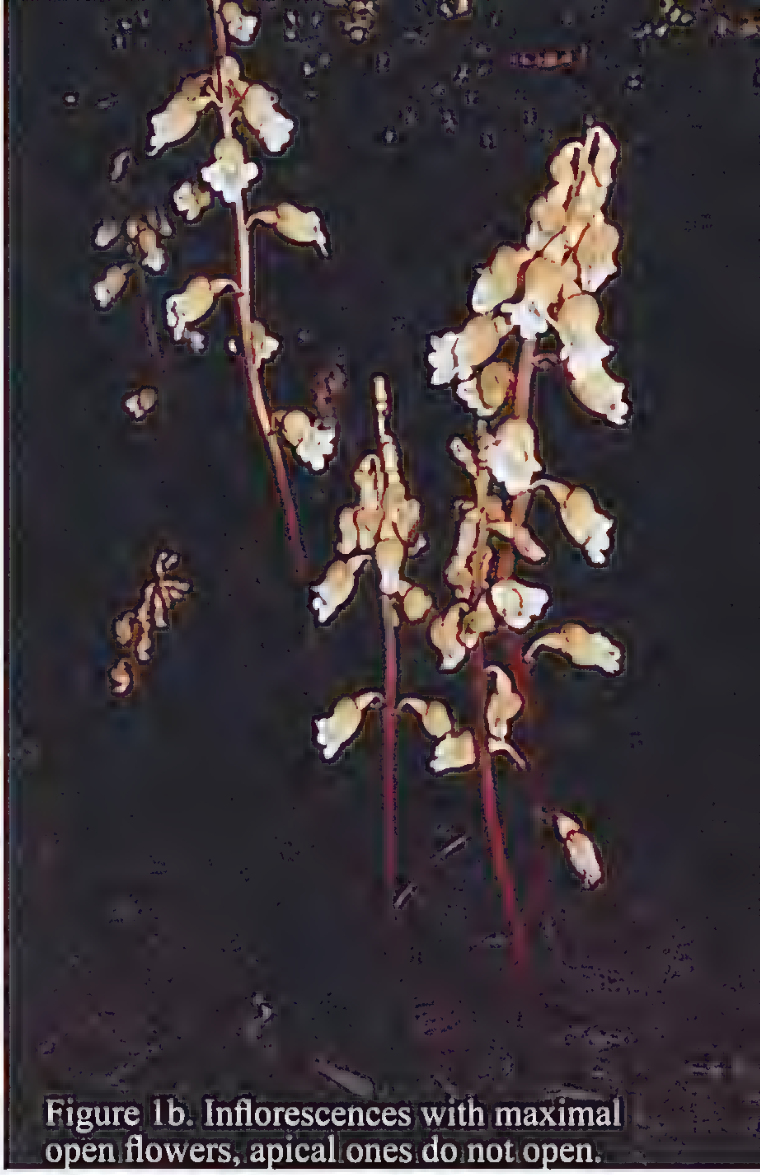


Figure 1b. Inflorescences with maximal open flowers, apical ones do not open.

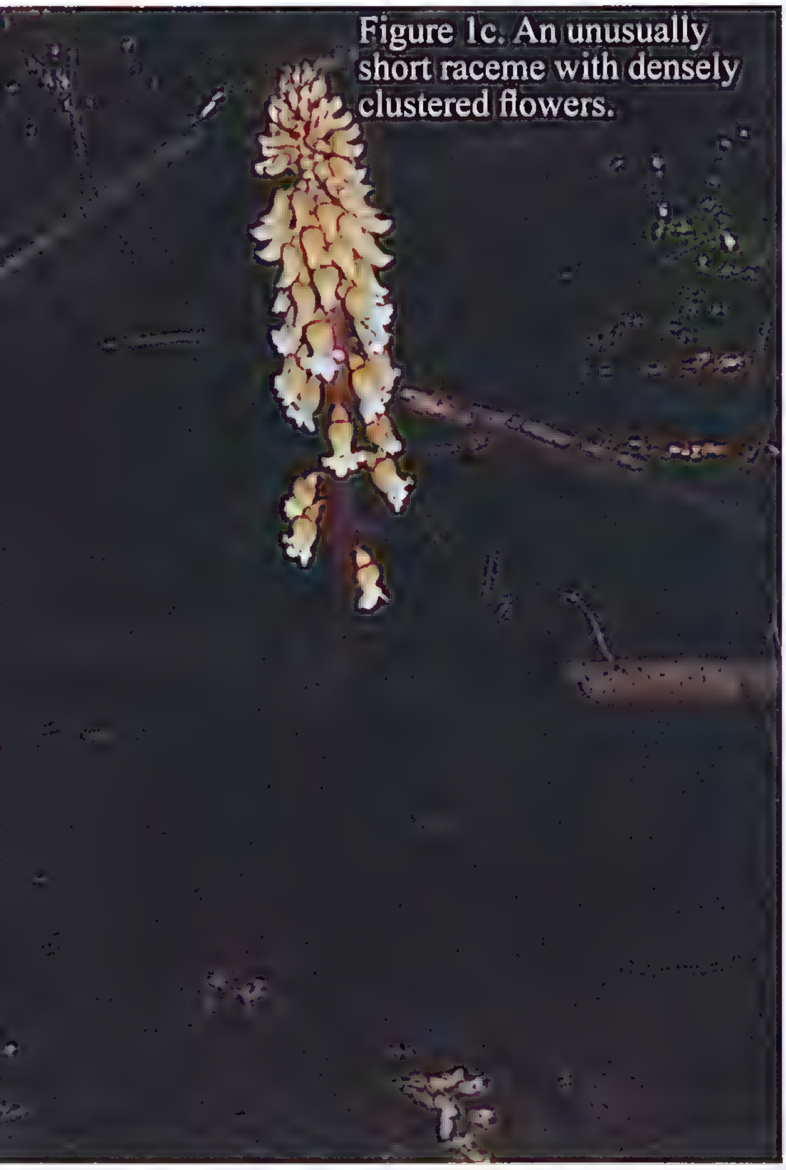


Figure 1c. An unusually short raceme with densely clustered flowers.

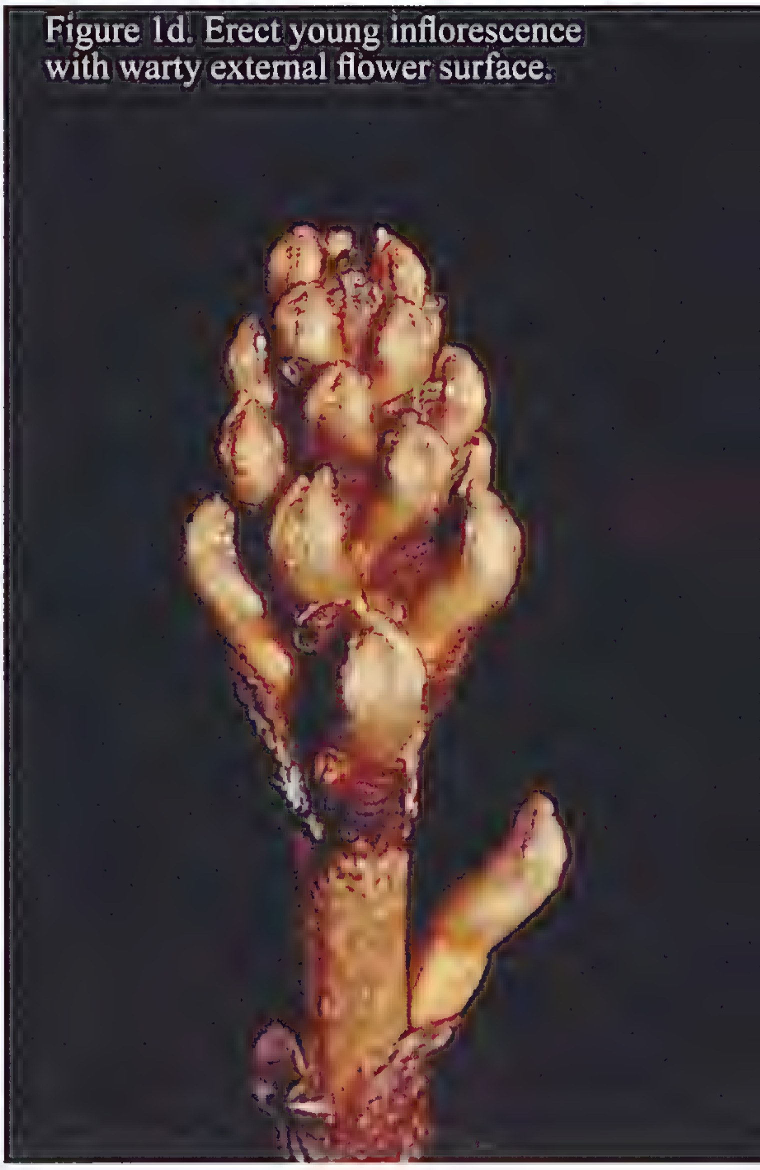


Figure 1d. Erect young inflorescence with warty external flower surface.

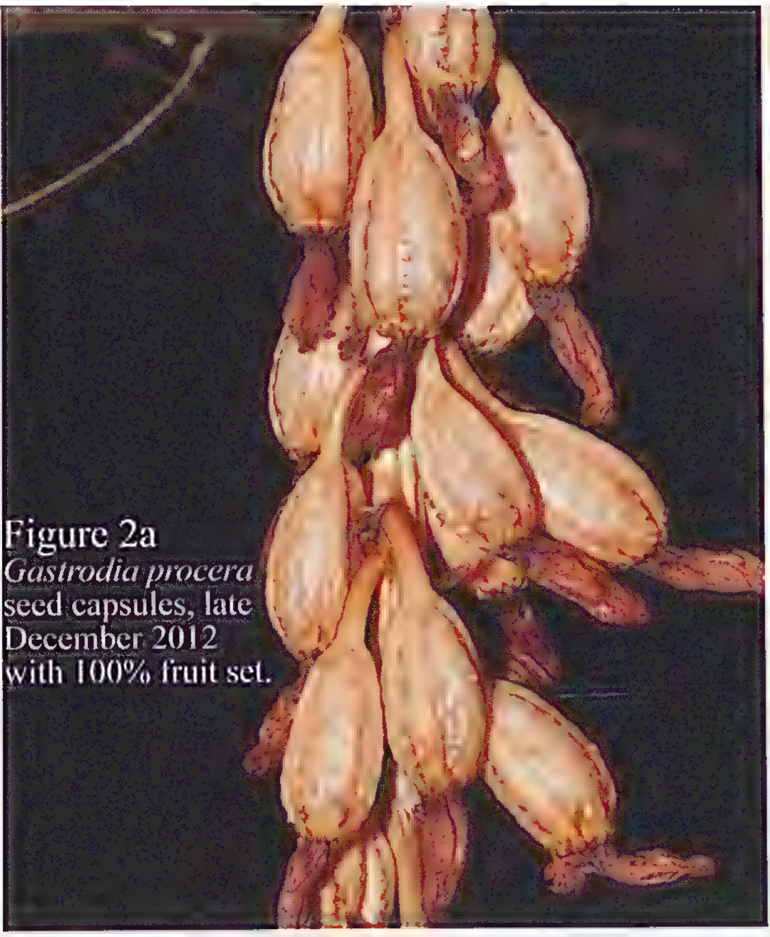


Figure 2a *Gastrodia procera* seed capsules, late December 2012 with 100% fruit set.

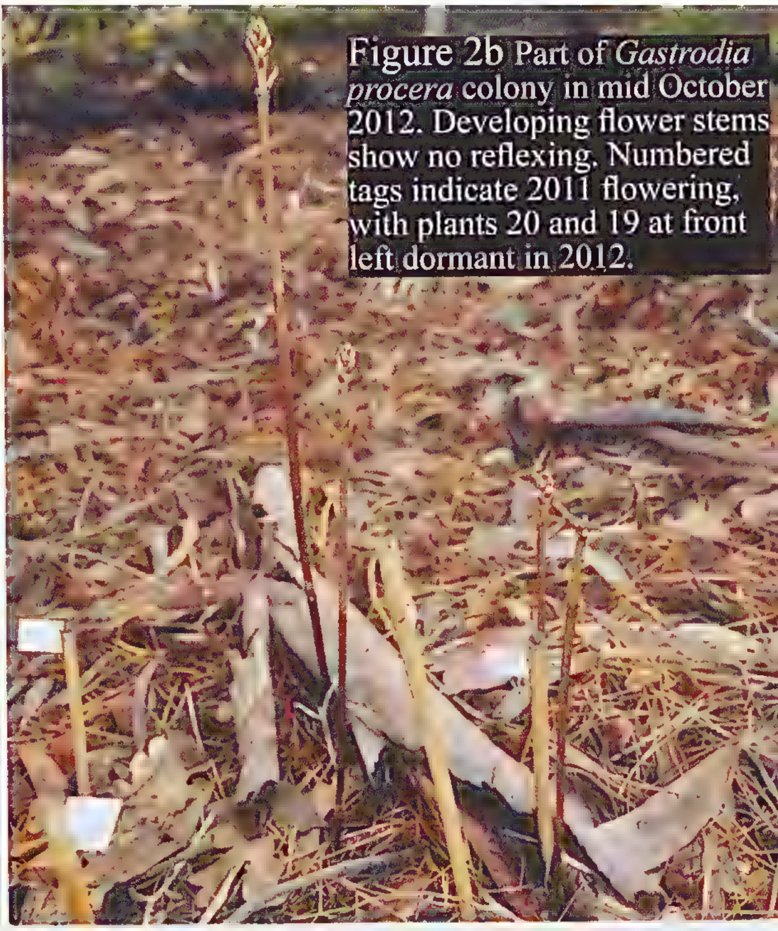


Figure 2b Part of *Gastrodia procera* colony in mid October 2012. Developing flower stems show no reflexing. Numbered tags indicate 2011 flowering, with plants 20 and 19 at front left dormant in 2012.

Results and Discussion

Site Description

The cedar tree has a tall spire shape to 20 m height with a basal canopy diameter of 15 m. It castes a fairly dense shade with a build up of 10–25 cm of litter, deepest on the north, east and southern aspects. The lower branches slope downwards so that water runoff is greatest near the canopy edge, while areas closer to the trunk receive lower amounts of water and the litter is predominantly dry. There is some runoff of rainfall from a driveway on the northern side with the wettest areas under the canopy edge on the east and southern aspects. In all seasons where flowering stems developed, they were found in the outer half of the shaded area on the north-east and south.

Growth Cycle of *Gastrodia procera*

In late September inflorescences emerged from the leaf litter bed and rapidly elongated over the next month (Figs.1a,b,c,d). During November the flowering began progressively from the base. At the apex of the stem most flowers did not open at all. Flowers that opened remain open for only a few days and ovaries rapidly swelled. On December 9th the lower inflorescences had well developed capsules, and the upper flowers were still opening or remain closed near the apex (Fig. 2a). From December 24th to January 6th there was abscission of capsules with seed release from all flowers, followed by gradual withering and deterioration of the stems. Between March and April the stems collapsed and became dark brown to black and broke down. Some tubers remained dormant (Fig. 2b).

Inflorescences

The area was monitored and flowering was recorded in the flowering years 2010–2012. Results were similar but heights of stems and number of flowers per stem were maximal in 2011. Measurements of the 2011 flowering are presented in Table 1. Height of stems ranged from 42–128 cm, with most over 80 cm. Flower counts were higher on taller stems (range of 15–48 flowers per stem). A few inflorescences were grazed by animals (rabbits and wallabies) and did not reach maturity. Conversion rates of flowers to capsules was very high, mostly 100%. In subsequent years netting was used with success to keep out grazing animals.

Distribution of Inflorescences

In 2011 stems were marked and numbered with sticks to allow future comparison with the 2012 or later seasons (Fig. 3a). In 2012 the emergence points of inflorescences was different (Fig. 3b). Some appeared close to the 2011 markers (and could represent flowering from a different part of the same underground tuber) while others were distinctly distant, indicating flowering from previously dormant tubers. In 2012, three stems emerged 4 m to the south of the main colony but still in the deep litter from the *C. deodora*. Two flowered again at this site in 2015 and 2016 with flower counts 14–18 per inflorescence.

Pollination

There are few reports of pollination in *Gastrodia* and it is variously described as insect related (Jones 2006) or not mentioned. An exclusion experiment, by enclosing the flower stems with insect proof flywire in late September well before they opened, demonstrated that the flowers are self pollinating. All 5 enclosed flowering stems had 90–100% capsule formation (Table 1). Dissection of flowers of different ages of development showed that the flowers are closed at the time of pollen running down in fragments from anther to stigma (Fig. 3c).

The self pollination involves the development of an anther above a longitudinal stigma with no functional rostellum separating the two structures (Fig. 3c). The rostellum is described as not prominent by P. Weston (in Harden 2014). The pollinia, initially a firm mass, fragments and flows onto the stigma (Fig. 3b), similar to that described by Jones (1985) and Zhou et al (2012) for *Epipogum roseum*, a tropical Australian and Asian saprophyte. This mechanism is also seen in *Cyrtosia sepentionalis*, a saprophyte growing in similar shady conditions in an understorey habitat in Japan (Suetsugu 2013).

By the time that flowers have opened, the internal reproductive structures have begun to wither and the ovary is swollen with developing seed (Fig. 3c). Insects were not observed in many hours of inspection, and they are unlikely to be involved in pollination. The structure of the flower at the time of the pollinia starting to disintegrate is presented in Fig. 4.

Pseudopollen arising from degradation of multicellular hairs containing starch has been described in *G. procera* (Jones 2006) and is regarded as an attraction to pollinators, especially in nectarless flowers. If present, it does not appear to act in that way as the flowers are closed. The orange-yellow coloured material on the labellum may represent papillose outgrowths or irregular calli rather than pseudopollen, and could be studied further.

Rainfall and Flowering

Rainfall records from Coldstream, the nearest recording station, were used. Mt Evelyn rainfall is significantly higher, but no local measurements are available. There were no sightings of flowering plants at the site between 1995–2009. The area was relatively dry in 2000-2009 with a yearly rainfall of 571–829 mm, and most years less than 700 mm. (Table 2) The drought broke, with much higher rainfall in April to October 2010 of 678 mm, yearly rainfall of 1026 mm (Table 2) and17 flower stems. Flowering continued in 2011 and 2012 with an annual rainfall of 1158 and 770 mm respectively. There was little or no flowering in 2013–16, with low to average annual rainfall.

There is a strong relationship between flowering and higher rainfall. Flowering commenced in the year after the dry period ended and when rainfall was 50% above average, and it continued for a further two seasons when rainfall was around average. This suggests that the tubers are activated to flower by higher rainfall, developing sufficient storage of nutrients to enable flowering for a further two years before going back into dormancy.

Rainfall was higher than average in autumn, spring and summer over the two wetter years (Table 2). Rainfall gives a general indication of available soil moisture. The colony is shaded by the tree and receives far less rain than a more open site where rainfall measurements are taken. The runoff from the sloping driveway next to the site cannot be quantitated.

Excavation of Tubers

In December 2011 the overlying litter and leaf debris were removed carefully to discover large brown tubers at 12–20 cm below the surface. Tubers were examined and measured and the position of inflorescences and new sprouts were recorded without disturbance (Table 3; Figs. 5a,b,c) . Maximum tuber length was 9.5 cm, and maximum width 4.2 cm. Shapes varied from linear to branched, and some appeared to have been joined to others in the past but now disintegrating, suggesting division and proliferation. Small tubers

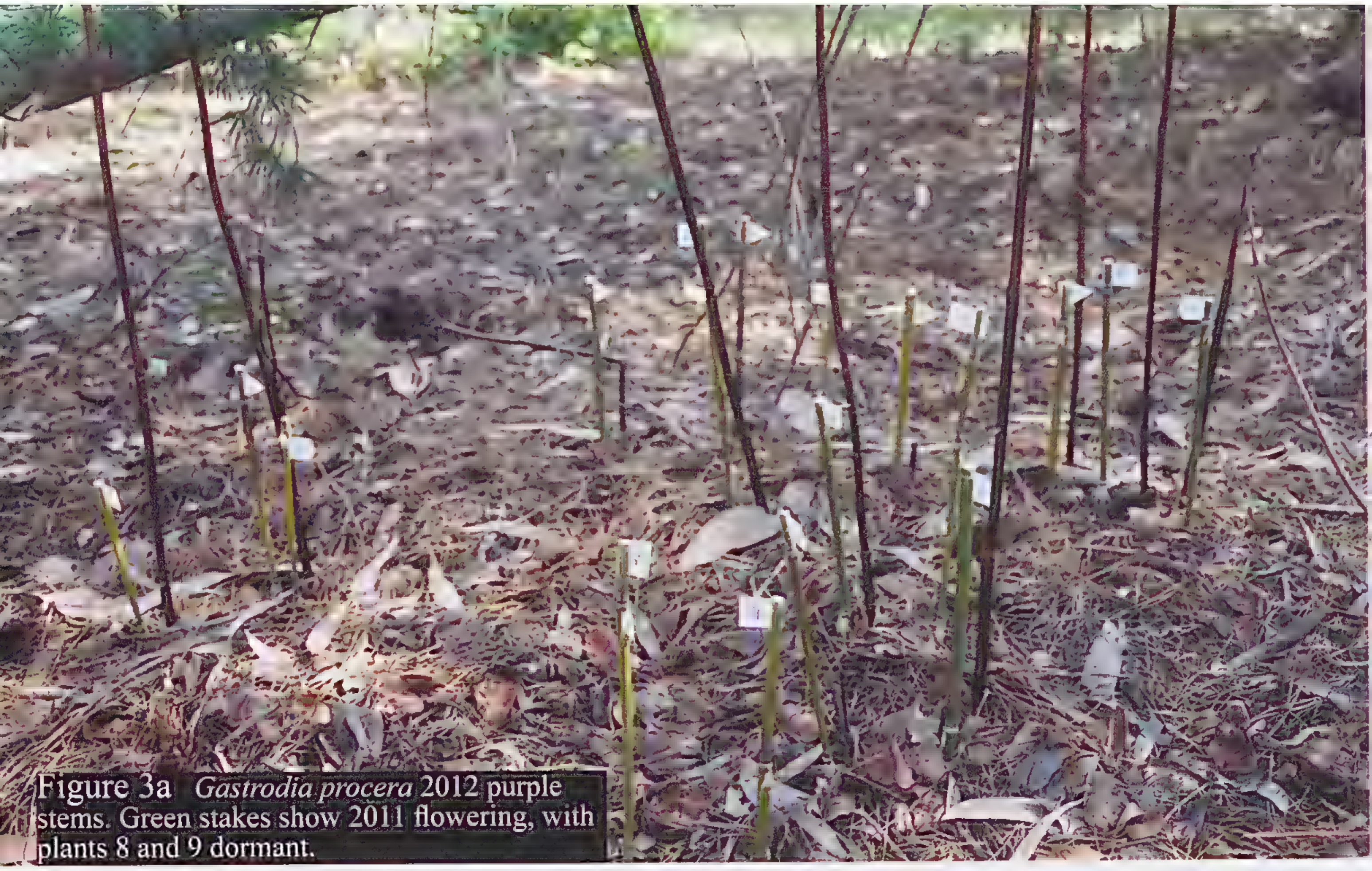


Figure 3a *Gastrodia procera* 2012 purple stems. Green stakes show 2011 flowering, with plants 8 and 9 dormant.

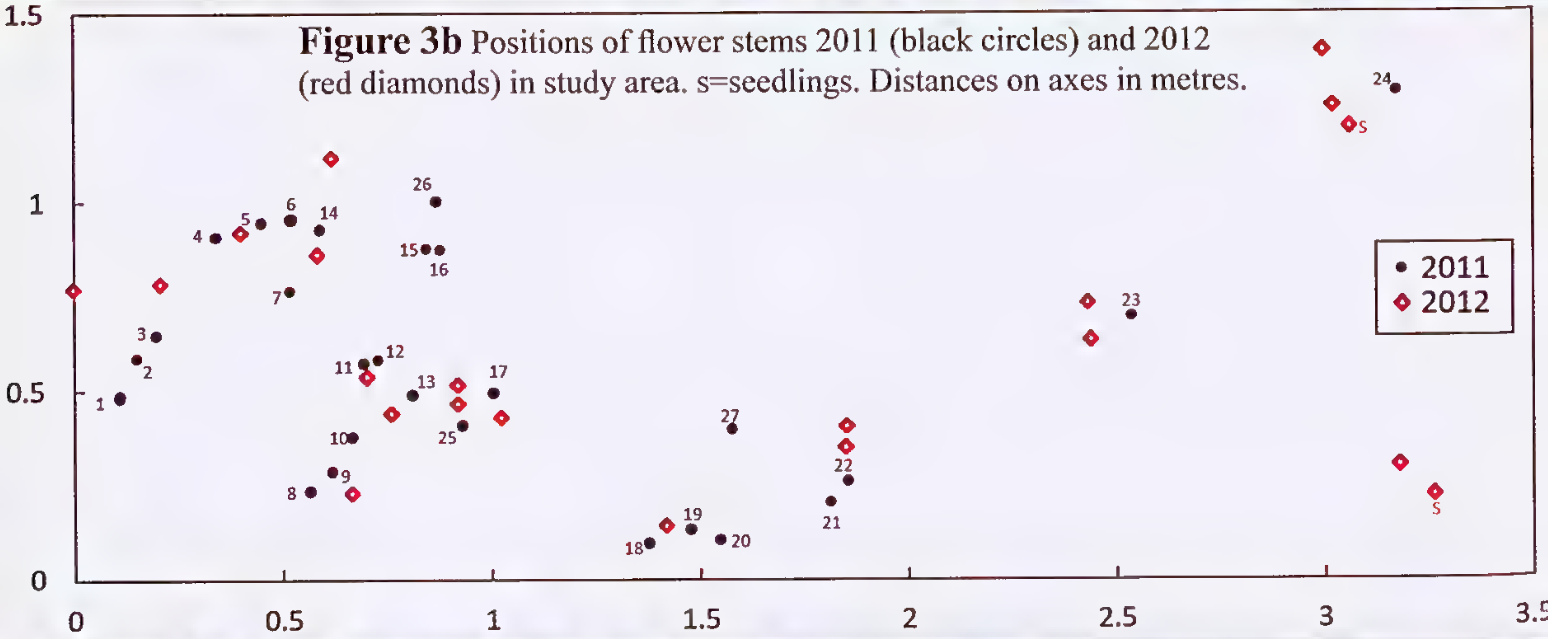


Figure 3b Positions of flower stems 2011 (black circles) and 2012 (red diamonds) in study area. s=seedlings. Distances on axes in metres.

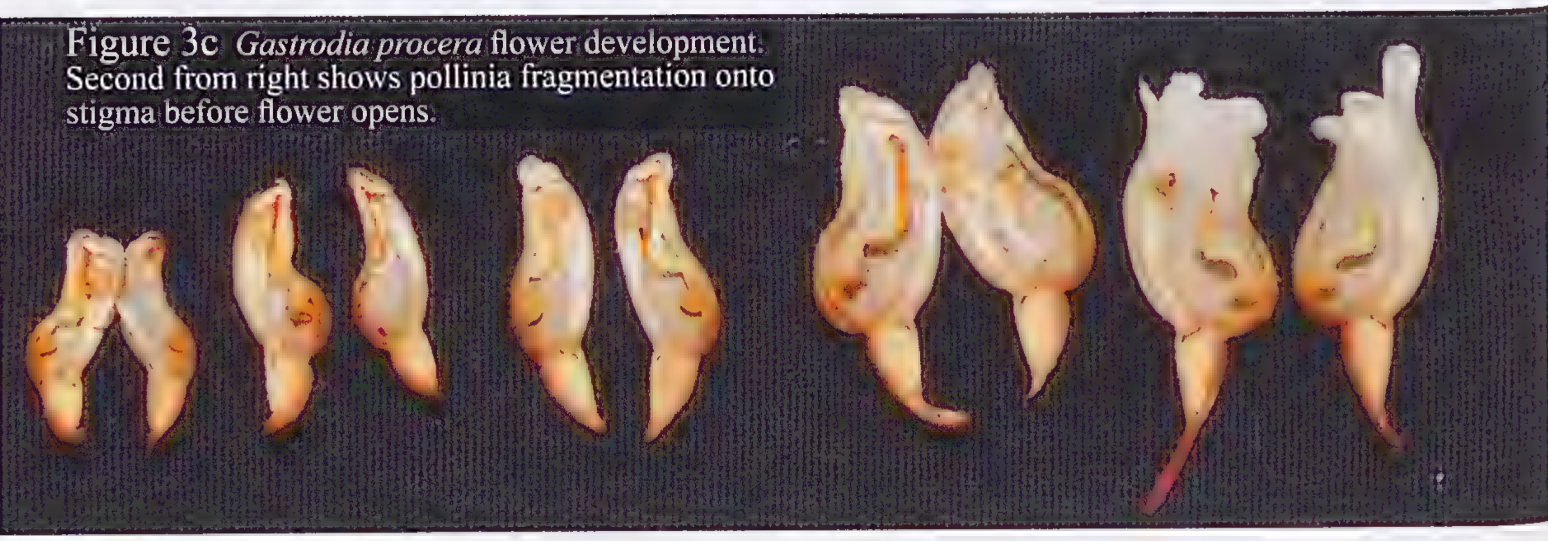


Figure 3c *Gastrodia procera* flower development. Second from right shows pollinia fragmentation onto stigma before flower opens.

that appear to be new are likely to represent new seedlings. Old and current inflorescence emergence points were visible along the tubers and at the apices. Tubers were re-examined in August 2017 following three seasons of little or no flowering. Tubers were around the same size and in good condition. There was no macroscopic evidence of fungal material near the tubers on examination in 2010, 2011 and 2017. Point excavations over the north-east-south aspects showed a large number of tubers throughout the total area, many of which had not flowered in the period 2010–2012, indicating that there was potential for a much greater number of flowering stems if conditions had been even more suitable. Although I am certain that no plants o any size were visible above ground level from 1995. There is no information concerning the year of their origin, which is assumed to be from nearby bushland.

General Discussion

The appearance of a large colony of *G. procera* in spring 2010 followed a wet year with more than 50% increase above average rainfall preceded by drought. The following year was also wet and flower stem numbers increased from 17 to 27. The leaf litter under the *C. deodora* tree is up to 25 cm deep and prone to drying out in low rainfall years. There is a strong correlation between amount of rainfall and the emergence of flower stems. Despite reduced rainfall in 2012 flowering continued with 22 stems, and the tubers may have developed sufficient nutrient storage from heightened fungal activity in the wetter years to permit another year of flowering. Flowering dwindled in subsequent years with average rainfall. Another possible factor in the success of the colony may be the runoff of water from the adjacent driveway. Mycorrhizal fungi tend to grow best at low soil pH, which is promoted by decomposing *Cedrus* litter. The large size of the colony is likely to result from the deep layer of composting litter.

The successful flowering may be linked to the interaction between the *G. procera* tubers and their associated fungus. Dearnaley et al (2010) have used carbon isotopes to show that *Gastrodia sesamoides* is an unusual saprophyte in that it is relying on exogenous fungus in the adjacent soil, which is highly dependent on available water in the compost. Most obligate mycoheterotrophic orchids have masses of mycorrhizal fungi (pelotons) in the cells of the tubers and water is freely available to them via fungi from the vascular system of the tree host. In contrast, *Gastrodia* tubers depend on fungal activity in an adjacent wet litter layer. Tubers in litter layers that are thinner and dryer are unable to flower.

Excavation of the soil revealed a large complex system of many tubers, some sprouting new buds, some developing into large outgrowths. They may survive in good conditions over many years. Tagging of inflorescences showed that they were produced from different parts of the tubers in different years. Light & MacConaill (2006) tagged *Epipactis helleborine*, an introduced species in Quebec, Canada for 20 years and found that 62% emerged once, under large trees. This colony has tubers that are in good condition despite three non-flowering seasons, and will be monitored over the next few years.

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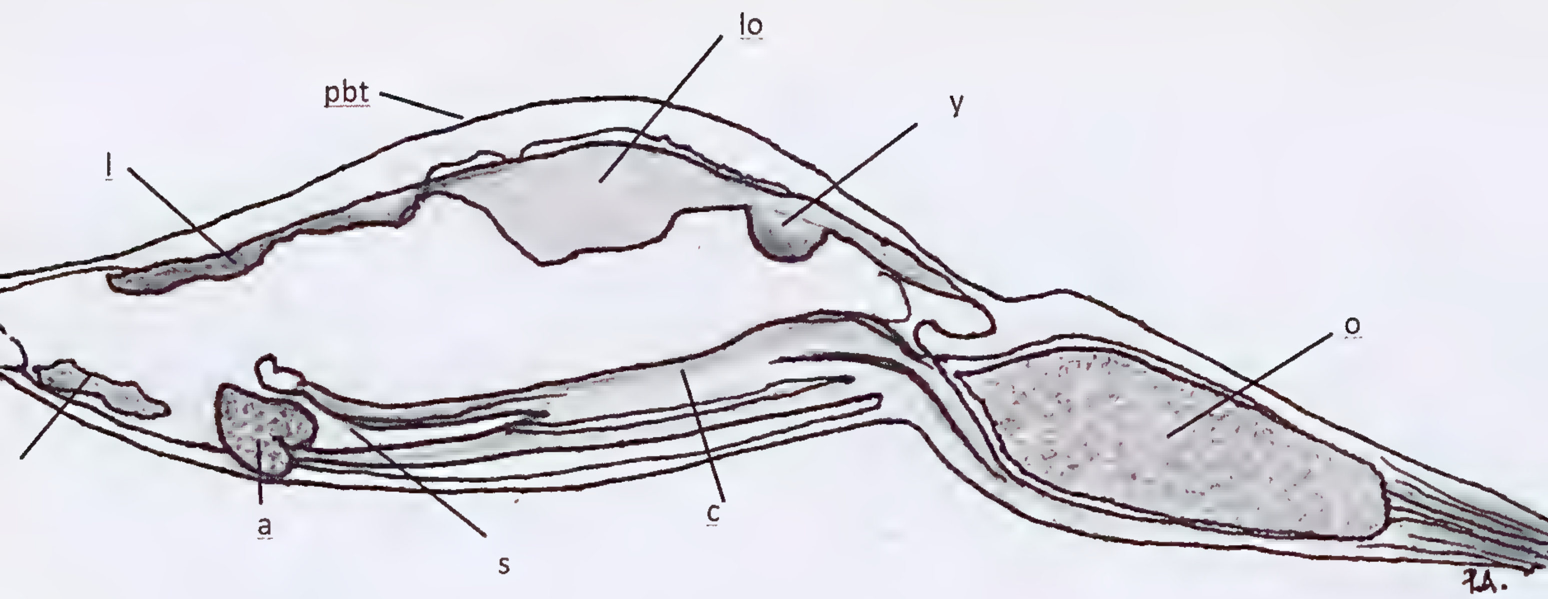

Figure 4. Longitudinal section through *Gastrodia procera*

The unopened flower just before the yellow stigma releases pollen fragments onto the slit-like stigma below. The column is below the stigma running to the apex of the ovary. On the other side of the flower is a bright orange labellum with a yellow callus toward the base and a larger light orange callus in the mid-position. The ovary contains developing ovules.

Legend: a anther; c column; l labellum; lf labellar fragment; lo light orange callus; o ovary; pbt pale brown tepals; s stigmatic cavity; y yellow callus.

Table 1. *Gastrodia procera* inflorescence details 2011.

Inflorescence	Stem ht. cm	Stem diam. cm measured at ground level	No. flowers	No. seed Capsules	Conversion rate of flowers to capsules
1	96	0.9	24	24	100%
2	86	0.8	35	35	100%
3	63	0.7	grazed	-	-
4	59	0.8	26	23	88.5%
5	101	0.8	22	22	100%
6	68	0.4	15	10	66%
7	100	1.0	38	35	92%
8	77	0.8	grazed	-	-
9	68	0.7	grazed	-	-
10	38	0.25	grazed	-	-
11	87	0.7	30	27	90%
12	46	0.4	grazed	-	Grazed
13	88	0.9	28	28	100%
14	74	0.7	grazed	-	-
15	82	0.6	17	14	87.5%
16	83	0.7	24	24	100%
17	96	1.0	37	37	100%
18	86	0.8	grazed	-	-
19	108	1.1	26	25	96%
20	94	0.8	28	25	89%
21	91	0.9	30	26	86.6%
22	93	0.8	27	27	100%
23	42	0.45	grazed	-	-
24	128	1.2	48	48	100%
25	76	0.7	grazed	-	-
26	92	0.8	26	26	100%
27	105	0.9	24	22	91.6%

Table 2. Number of flowering plants of *Gastrodia procera* and annual rainfall.

Year	No. flowering plants	Annual rainfall mm (Coldstream data)	Rainfall mm April to Oct.	Rainfall mm Nov. to March
1995-1999	0	475-877		
2000	0	788		
2001	0	653		
2002	0	637		
2003	0	799		
2004	0	829		
2005	0	694		
2006	0	571		
2007	0	654		
2008	0	579	407	219
2009	0	638	489	125
2010	17	1026	678	364
2011	27	1158	738	494
2012	22	770	568	181
2013	0	660	475	202
2014	0	650	516	159
2015	2 + 2 *	622	418	172
2016	4 + 2 *	775	570	191

* plants flowering south of study site nearby under same *Cedrus deodara.*

Table 3. *Gastrodia procera* tuber measurements 2011

Plant number	Tuber width cm	Tuber length cm	Position of stems on tuber
7	3.8	23	Apical x 1
8	3.0	9.5	Apical x 1
9	4.2	6.0	Apical x 2 (each end)
10	1.9	4.1	Narrowed central x 1
18	2.9	6.4	Apical x 1

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Figure 5. Tubers

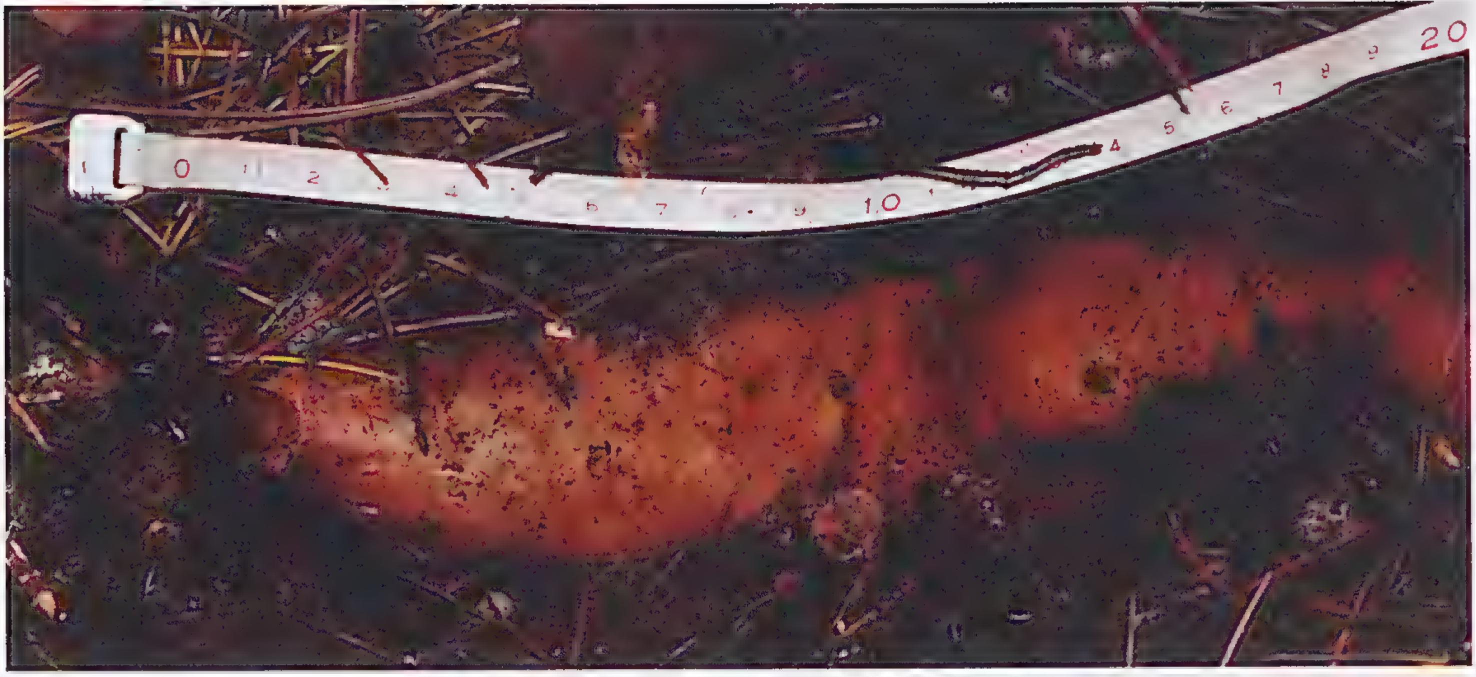

Figure 5a *Gastrodia procera* long narrow tuber with flower stem arising at left apex.

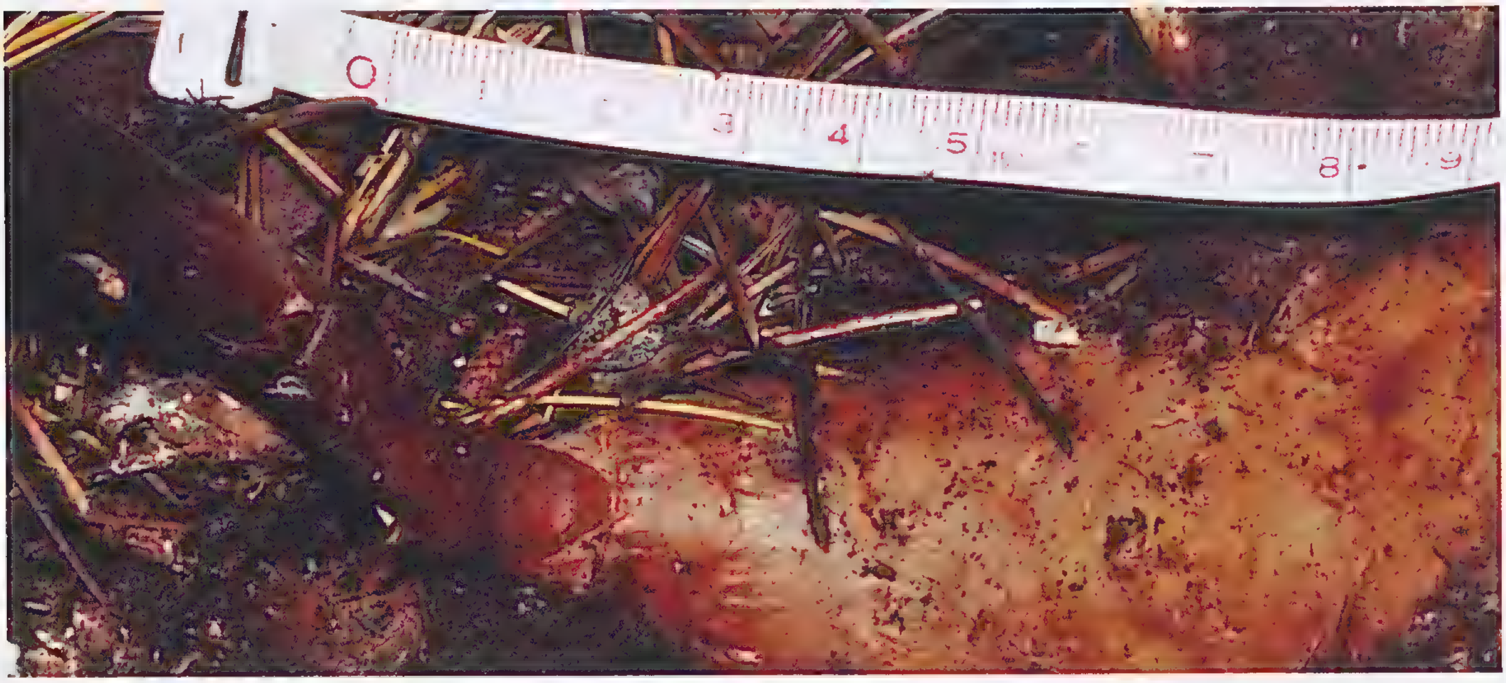

Figure 5b Wide tuber with flower stem arising at left.

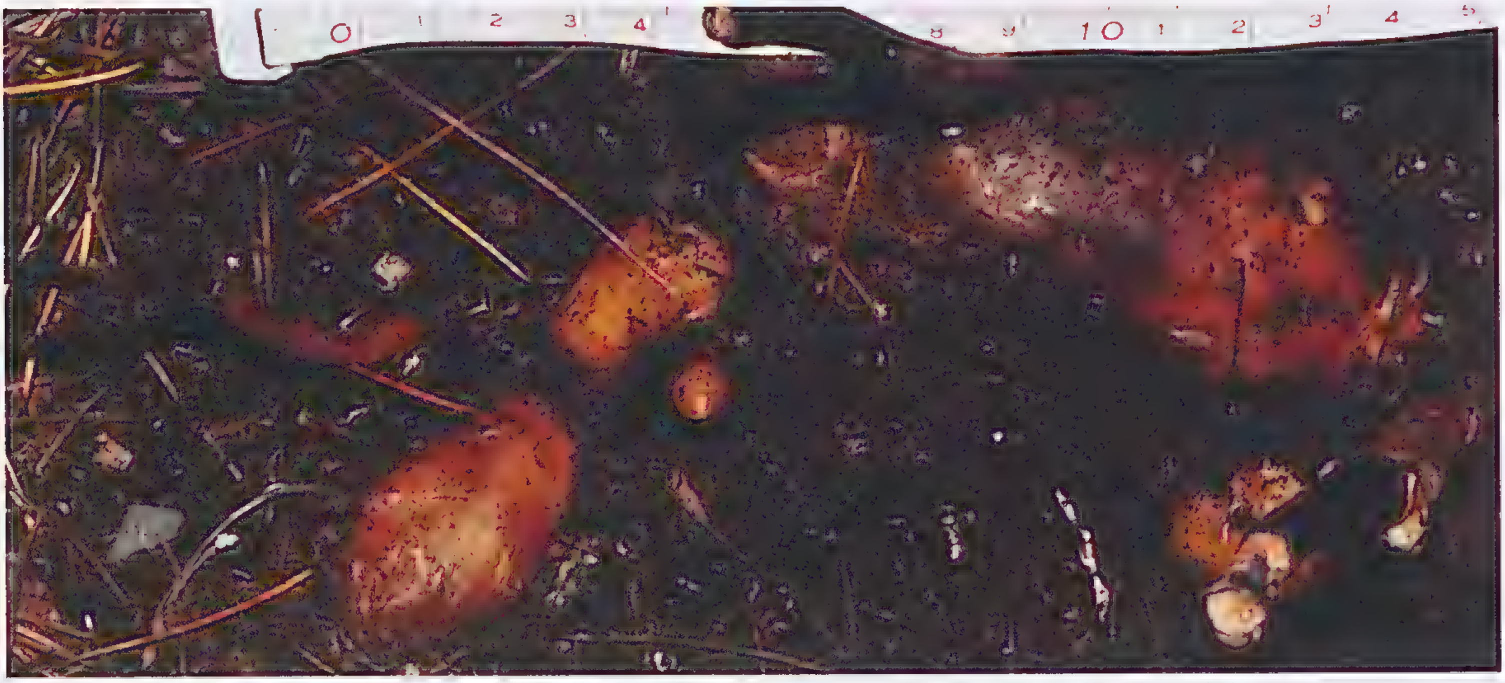

Figure 5c Tuber showing decay where old flower stem arose, creating a division.

Selected Progeny of *Dendrobium* Elegant Heart

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In Australian *Dendrobium* hybrids there are a limited number of parents that have been used repeatedly with consistent positive results. One of these hybrids is *Dendrobium* Elegant Heart. It can be found in almost any extensive Australian native orchid collection nationally and there have been notable plants of *D.* Elegant Heart presented internationally.

Dendrobium Elegant Heart (50% D. *speciosum,* 25% D. *bigibbum* and 25% D. *tetragonum*) was registered by Walter T. Upton in 1986. It is a cross between *D.* Peewee and *D. speciosum* and is one of a number of Upton's early *D. bigibbum* crosses. *Dendrobium bigibbum* x *D. tetragonum* was registered as *D.* Peewee by W. & J. Cannons in 1979. *Dendrobium bigibbum* is a complex of four varieties including var. *superbum* Rchb.f. (1878), which was formerly *D. phalaenopsis* Fitz. (1880). The well known *D. phalaenopsis* was described later than var. *superbum* and is now reduced to synonymy with it (Adams 2015, Adams & Lawson, 2016). A crossing of *D. phalaenopsis* x *D. tetragonum*, registered by Willersdorf as *D.* Suzanne in 1965 is essentially the same as *D.* Peewee, as *D. bigibbum* is now understood. A hybrid containing 10% *Dendrobium bigibbum* or more may require an amount of protection during the winter months in the southern states of Australia and if the temperature is consistently below 8°C then heating is required for growing to achieve optimum results. Due to the high percentages of *D. speciosum* and *D. tetragonum, D.* Elegant Heart can easily be grown in most states of Australia, in contrast to Tropicool™ hybrids that contain a high percentage of *D. bigibbum* in their species composition.

There have been many remakes of *D.* Elegant Heart over the years using different varieties of *D. speciosum*. Neil Finch and the late Brian Gerhard have been responsible for many of these remakes, most notably using *D. speciosum* var. *curvicaule* and var. *pedunculatum*. Neil Finch bred the two most outstanding examples of *D.* Elegant Heart in my opinion, these being 'Harlequin' (Fig. 1) and 'Doreen'. Both cultivars have been used extensively in breeding and have produced outstanding results that have been responsible for the rapid advancement of Tropicool™ dendrobiums. In this article I explore the outstanding progeny *Dendrobium* Elegant Heart has produced.

Dendrobium Jayden

Registered in 1994 by W. T Upton, *D.* Jayden is arguably the most prominent and successful of the progeny of *D.* Elegant Heart. When *D.* Elegant Heart is crossed back to *D. speciosum*, the segments widen and the overall balance of the flower shows improvement. The major advance in this generation is the widening of the labellum, something that does not always occur in hybrids heavily influenced by *D. speciosum*. The colour variation of the grex is quite extreme, ranging from pure crystalline white to the darkest 'Greta' awarded AD/ANOS in 2010. The most outstanding example is perhaps *D.* Jayden 'Anthony' HCC/AOC (2008). This plant was bred by Neil Finch and its parentage is *D.* Elegant Heart 'Harlequin' x *D. speciosum var. pedunculatum* 'Herberton'. *D.* Jayden 'Anthony' has excellent shape and colour but the most memorable feature is the substance and texture of the flowers, which is truly outstanding. To date there are only two registered progeny, *D.* Jayquest and *D.* Greta Snow.

Dendrobium Greta Snow

Dendrobium Greta Snow (registered in 2010 by Cedarvale Orchids) is *D.* Jayden x *D. specisoum* (Fig. 2). The original *D.* Greta Snow bred by Don Cruickshanks used *D. speciosum var. curvicaule* 'Apricot Surprise'. I was first exposed to these plants in 2010 while visiting Don's home and they were breath-taking. As the name implies they are snow white in colour with very little variation, although I have flowered some seedlings that could be classified as cream to off white. If you have seen a well cultured *D.* Greta Snow such as 'Samford Celestial' FCC/AOC 2012 or 'Cheryl' FCC/AOC 2016, AM/ANOS 2013, you will find perfectly proportioned and balanced flower segments, a broad labellum, clear colour and a flower count not matched by any Tropicool™ *Dendrobium* of its type. Although *D.* Greta Snow is 87.5% D. *speciosum* the influence of the 6.3%

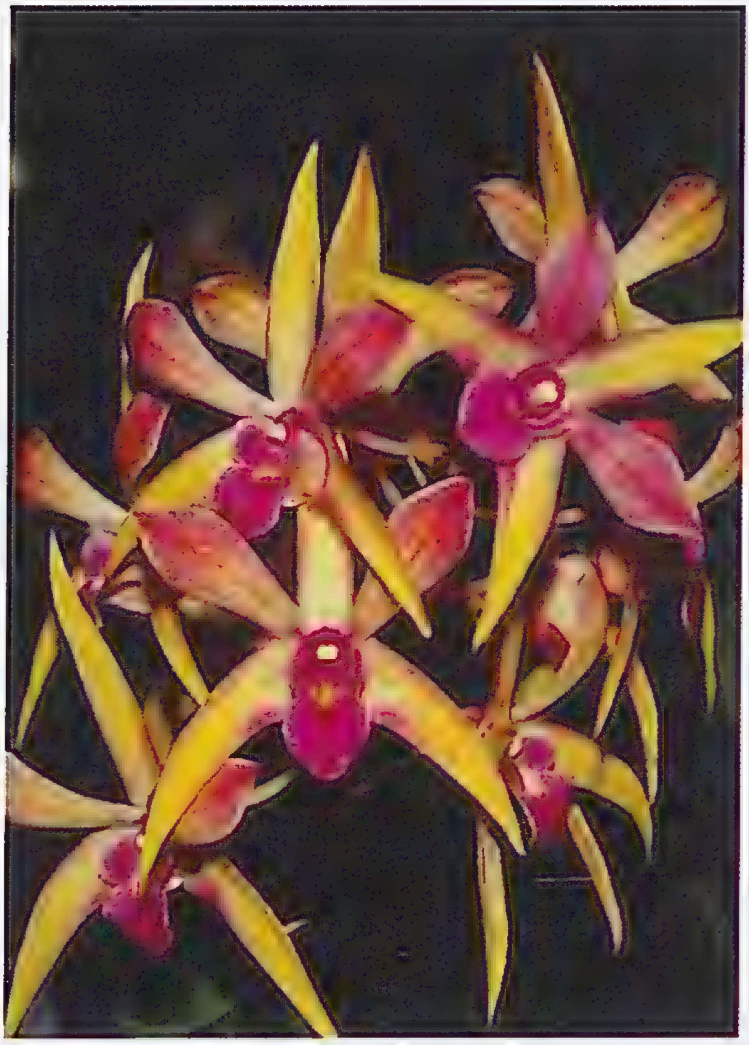

Figure 1. *D.* Elegant Heart 'Harlequin'.

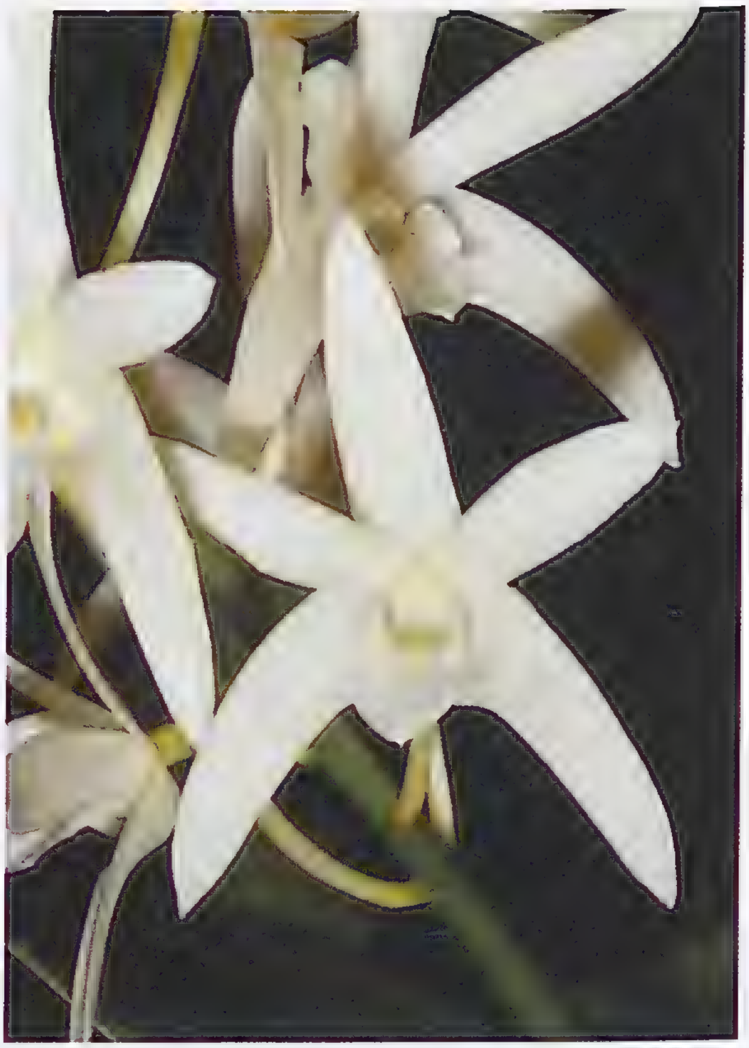

Figure 2. *D.* Greta Snow 'Cheryl' AM/ANOS 2013, FCC/AOC 2016.

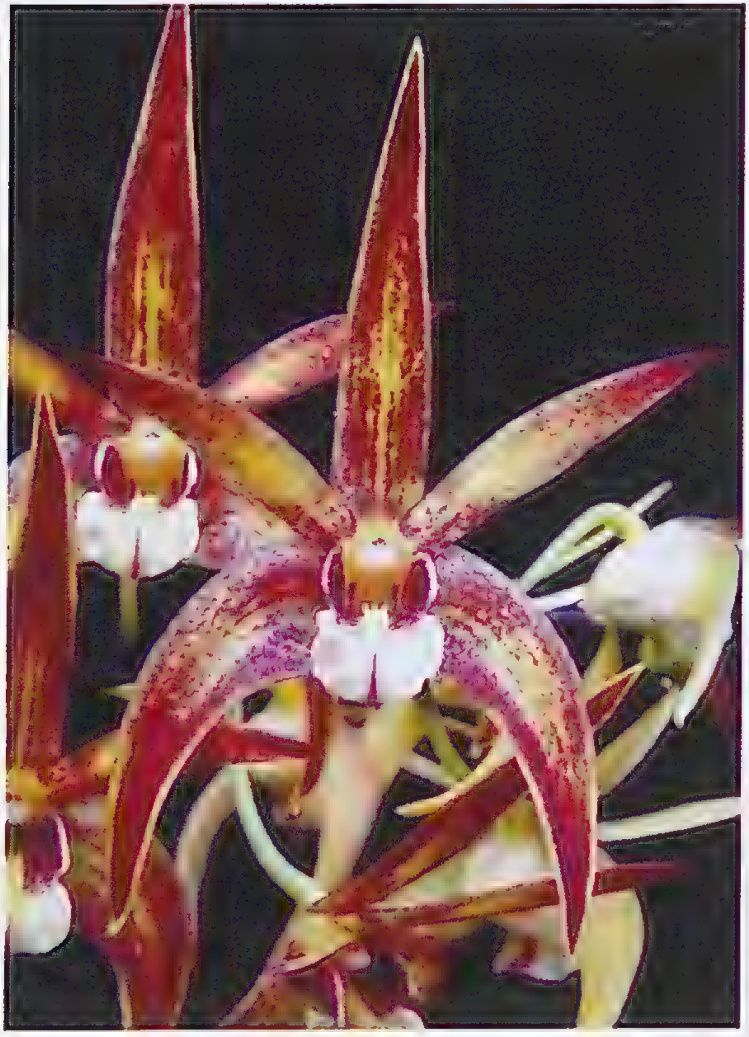

Figure 3. *D.* Dexter.

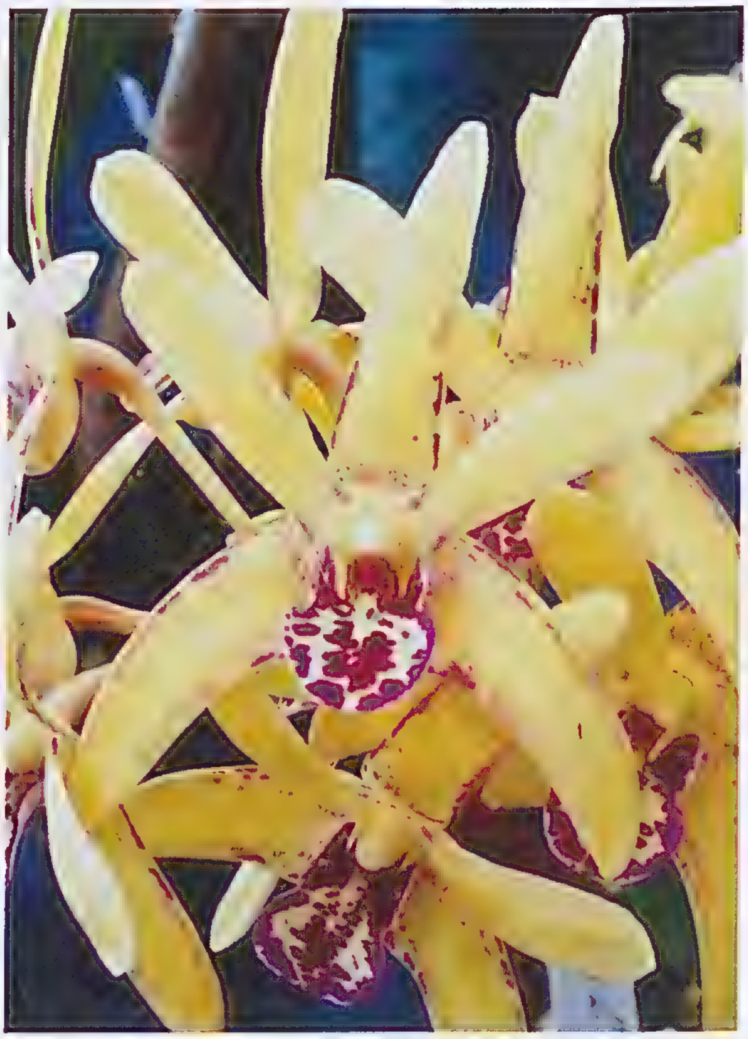

Figure 4. *D.* Monroe 'Marilyn'.

of *D. tetragonum* and the same percentage of *D. bigibbum* is still clearly visible. I believe these plants will provide major advancements in future generations.

An example of a cross I have made is *D.* Greta Snow x *D.* Dunokayla. I believe the addition of 9.4% of *D. fleckeri* and 3.1% each of *D. falcorostrum* and *D. jonesii* will create an even more shapely flower and a more balanced labellum. Importantly plant size will also be reduced.

The particular direction of breeding that seems to be extremely popular is the continual crossing back to *D. speciosum*. *Dendrobium speciosum*'s positives far outweigh its negatives but I urge breeders to diversify the *Dendrobium* species they use in future generations. An example of positive results because of diversification is *Dendrobium* Sarah Jane.

Dendrobium Sarah Jane

Dendrobium Sarah Jane is not often seen but is nonetheless a very important example of my above statement. It was registered by W. T. Upton in 1991 and is a crossing of *D.* Elegant Heart x *D. jonesii* making the species composition 50% *D. jonesii*, 25% *D. speciosum*, 12.5% *D. tetragonum* and 12.5% *D. bigibbum*. The best known cultivar would undoubtedly be 'Purvis' and it strongly supports species diversification. *Dendrobium* Sarah Jane 'Purvis' presents large open flowers that display above expectation. The shape is a vast improvement on its parents, however the most impressive achievement is the intensity of colour due to *Dendrobium jonesii*, a species that has been underestimated in hybridisation. I have flowered *D.* Sarah Jane and *D.* Brinawa Charm 'Lucky's Toy' AM/ANOS x *D. jonesii*, and both have shown improvement in shape and colour intensity. I will be expanding the use of *Dendrobium jonesii* and its hybrids in the Down Under Native Orchids (DUNO) breeding program because of these findings.

Dendrobium King of Hearts

Registered in 2002 by DUNO, *D.* King of Hearts is a spectacular hybrid. It is the result of *D.* Elegant Heart x *D.* Kathking. Not one seedling of *D.* King of Hearts that Don Cruickshanks or I have flowered has been disappointing. The colour variation is quite large, from pale pink to dark red and every colour in-between, and some even have spotted patterning. The success is directly related to the 43.8% *D. kingianum*, further supporting using species diversification. Improvements have been made on the overall shape, however these plants are not large. The compact nature of *D.* King of Hearts has not affected the flower size nor has the influence of *D. kingianum* affected the flower count. There are three registered progeny. One is *D.* Hunter Revenge (registered C. Farrell 2015), which is *D.* King of Hearts 'Genesis' x *D.* Zip 'JMcM'. I have continued this breeding line with *D.* Hunter Revenge x *D.* Inquest and the results have been impressive. Intense colours and improved shape are recurring characters as this breeding line progresses.

Dendrobium Dexter

This hybrid catches my eye every time I see one in flower or photographed. Registered in 2002 by DUNO, *D.* Dexter is *D.* Elegant Starlight x *D.* Hilda Poxon (Fig. 3). It has a complex species composition but most notably contains 46.9% *D. tetragonum* and 1.6% *D. fleckeri*. The colour tones are quite interesting and some may consider them not to be distinct. Usually set off by a lighter coloured or pure white labellum, *D.* Dexter is hard to ignore. Hybrids such as this provide gateways to new colours but maintain classic show bench shape along with other important aspects of Tropicool™ *Dendrobium* breeding such as size and growth habit.

Dendrobium Stunning

Dendrobium Stunning is an important benchmark Australian *Dendrobium* hybrid. Registered in 1996 by N. Finch, it was the result of intelligent and planned thinking. The cross between *D.* Elegant Heart and *D.* Aussie Victory, this may well be one of the first multi-generational *Dendrobium* hybrids that inspired growers and breeders. It demonstrates just how successful *D.* Elegant Heart is as a parent and also proves the worth of *D.* Aussie Victory. There may have been only one quality award granted to *D.* Stunning, but its influence as a stand-alone plant and parent is undeniable. As with other hybrids containing *D. fleckeri*, *D. tetragonum* and *D. bigibbum* the colour spectrum is wide, ranging from buttercup yellow with coloured labellums to dark red. The one aspect of *D.* Stunning that remains consistent is its shape; all segments are well proportioned and rounded.

A successful progeny of *D.* Stunning is *D.* Monroe, and in particular the cultivar 'Marilyn', which displays large well shaped flowers with a purple labellum and matching markings on all segments (Fig. 4). *Dendrobium* Monroe 'Marilyn' has gone on to produce quality progeny in *D.* Duno Marilyn (*D.* Monroe x *D.* Dunokayla). While *D.* Stunning's popularity as a parent in recent years has subsided I believe that it is worthwhile reintroducing it in more complex breeding lines to continue improvements in shape and colour.

Dendrobium Binh-Ba

Registered by DUNO in 2012, *Dendrobium* Binh-Ba (*D.* Memoria Alicia x *D.* Aussie Victory) is the most recent example of a complex hybrid that shows *Dendrobium* Elegant Heart to be a successful parent. While *D.* Elegant Heart is multiple generations deep in this hybrid, features such as classical shape and colour variety are evident. This relatively new hybrid has already received quality awards, with 'Exotic' earning an AM from the AOC and a HCC from ANOS in 2016. I have flowered a number of seedlings ranging from deep purple in colour to more heavily marked and colourful, and many have excellent shape. Hybrids such as *D.* Binh-Ba make the future of Australian *Dendrobium* breeding exciting.

The above are all outstanding examples of Australian *Dendrobium* hybrids. The common factor is that somewhere in their, at times complex, backgrounds *Dendrobium* Elegant Heart is present. For a hybrid registered in 1986, its continual impact upon more modern hybrids is undeniable. There have been seven ANOS awards awarded to *D.* Elegant Heart's progeny to date and this number will continue to grow. *Dendrobium* Elegant Heart will continue to produce positive results when used in conjunction with a broad species composition. *Dendrobium* Greta Snow and *D.* Binh-Ba have had positive results on the Australian show bench but always remember where these hybrids originated from - *Dendrobium* Elegant Heart.

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Royal Horticultural Society's International Orchid Register http://apps.rhs.org.uk/horticulturaldatabase/orchidregister/parentageresults.asp.

Notes:

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Managing Orchids on a Private Protected Area in Tasmania

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Summary

The acquisition, challenges and management of an area in Tasmania containing 57 orchid species is described. This area of woodland and wet heathland is a Private Protected Area governed by a Covenant and Nature Conservation Plan. The highest priority is managing a population of *Prasophyllym limnetes* plants in their only known location. Over half of the Tasmanian *Thelymitra* spp. are present, enabling comparative studies of their local taxonomy and ecology. A key aim is the creation of knowledge about appropriate management activities, especially with respect to frequency and methods of burning and weed control.

Background

During the field work for *The Orchids of Tasmania* in the late 1990s, Tasmanian orchidologists regularly visited a property in central north Tasmania with the owner's permission. The property became known as an orchid hot spot and remains the only known location for *Prasophyllum limnetes*.

The 20 ha property was offered for sale in 2003, with fears of conversion to paddocks or rural residential development. After some fraught negotiations and hurried fund raising, led by Peter Tonelli, the property was purchased by the Tasmanian Land Conservancy (TLC). The TLC were persuaded that the property had important conservation values, and it became the first of their "revolving fund" properties. The TLC returned the property to market with additional protection provided by a Conservation Covenant.

In Tasmania, a conservation covenanted property is part of the National Reserve System (NRS) and therefore becomes a protected area. There are now about 800 such properties in Tasmania, sometimes described as private protected areas (PPAs), covering over 100,000 ha in total. A Covenant and associated Nature Conservation Plan (NCP) is an agreement between the land owner and the Tasmanian government that provides permanent restrictions on the land use and some prescribed management actions.

In 2007–8, we were planning our future in retirement and, after much agonising, purchased the TLC property as our own orchid hot spot. Having enjoyed many years of bush walking and nature study, this was a chance to give something back to the bush. We intended to care for it as best we could and learn as much possible about managing its threatened species.

Protected areas generally have an IUCN classification, and ours is Category IV Habitat/Species Management Area, which "...aims to protect particular species or habitats and management reflects this priority. Many Category IV protected areas will need regular, active interventions to address the requirements of particular species or to maintain habitats, but this is not a requirement of the category."

Probably the reason our property remained undeveloped in its agricultural setting is the presence of large shallow depressions that are seasonally waterlogged or flooded. These depressions are currently wet heathlands and home for most of our threatened plant species, including orchids. The depressions are surrounded by black peppermint (*Eucalyptus amygdalina*) sandy woodland, with its understorey dominated by bracken (*Pteridium esculentum*); a relatively common habitat in Tasmania.

Management Planning

It is a great privilege to own and live in a natural environment that provides a home to rare and threatened species. We knew that we were trading off time for golf, cruises and grandchildren in retirement for some hard work, especially in weed control and disturbance. Our recent Landowners Management Plan (LMP) that is endorsed by a revised NCP, sets out our vision: the property will support a resilient ecosystem that provides a secure home for priority species; and mission: to enhance the natural values and improve knowledge by monitoring and experimentation.

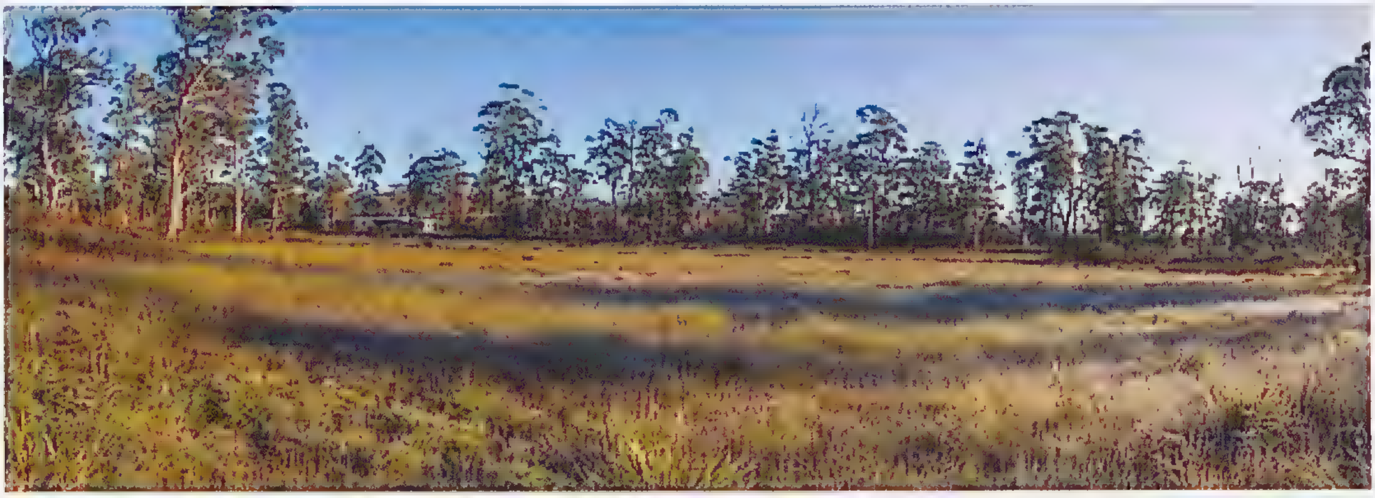

Figure 1. Shallow depression on property.

Anyone engaged in biological conservation is likely to face dilemmas. One of ours is whether we favour threatened (orchid) species or a threatened community in our shallow depressions (Fig. 1). The sedges, grasses and shrubs in wet heathland grow very quickly and exclude most sunlight at ground level within a few years of a burn. Disturbance by burning or slashing promotes orchid flowering, while lack of disturbance promotes the development of black gum (*Eucalyptus ovata*) woodland; a plant community that is threatened in Tasmania. In our LMP, we have a prioritised list of threatened species, with *P. limnetes* as the top priority species because we have the only known population. This is a fire (disturbance) opportunistic species, so in creating conditions for *P. limnetes* plants to flower, we cannot easily regenerate its heathland habitat into mature *E. ovata* woodland.

The bush has its own natural rhythms and evidence of our land management may not persist for long beyond our stewardship, depending on how future owners conduct their activities. In contrast, new knowledge persists in perpetuity. The main practical question that we seek to answer is "What is the most cost-effective method of land management to sustain populations of threatened (orchid) species?". Disturbance by fire is labour intensive, and we want to ensure that it is used to best effect. Also, there is an endless supply of weeds that we could tackle, and our efforts need to be prioritised and cost effective.

Management Activities

Burning was a regular feature of the landscape on our property prior to 2003, and local folklore is replete with stories of fire escapes. Black scars on trees are evidence of these fires, and images of the vegetation structure ten years ago show a much more open landscape than today. By frequent burning, the previous owner had managed the land to favour the local orchids, although this was almost certainly not his main intention.

The previous management practice is incorporated into the original NCP in the form of mapped burning zones, repeat burning frequencies and a recommended mosaic burn pattern. As new potential owners in 2007 this was a major issue. It was great fun surveying burnt public land for interesting orchids, but burning the bush ourselves?!?! We requested a demonstration by the TLC that burning is feasible on our property, prior to committing to the purchase. Two TLC staff persuaded local Tasmania Fire Service (TFS) volunteers to conduct a burn in autumn 2008, and then stayed overnight to supervise it. This provided the demonstration we asked for, and we were now fully committed (Figs. 2abcd).

The burning program, conducted annually, initially relied on a continuing relationship with the local TFS. The TFS also provided great insights about preparation and fire control. After several years of assistance, the TFS advised that they did not have the resources to burn our property every year. The district fire officer and local brigade chief gave us a morning of intensive training and then handed us full responsibility. Our methods and equipment have improved over the years, and we are now reasonably confident at conducting burns ourselves. However, we always remain vigilant especially around noon when the sea breeze

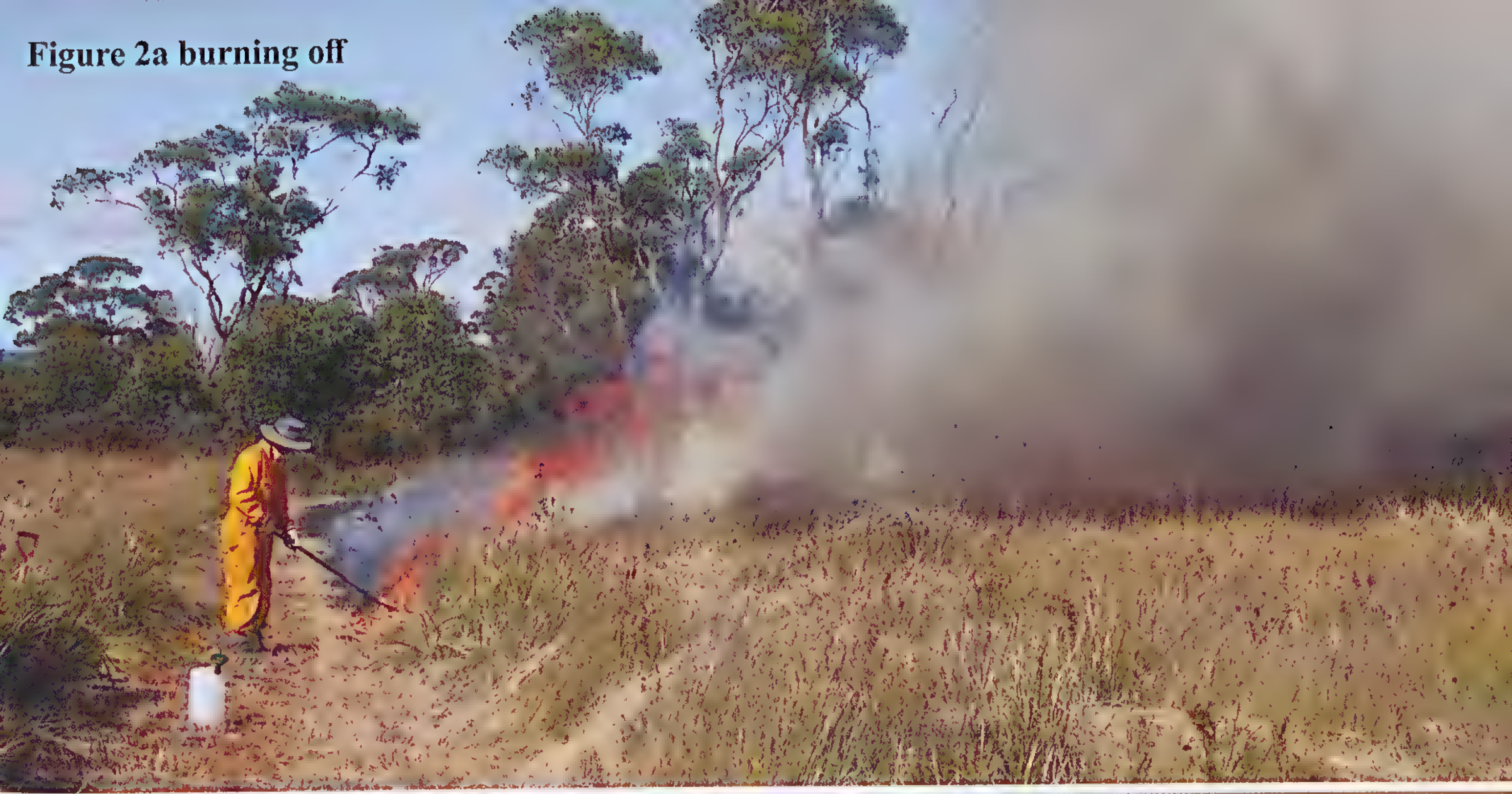

Figure 2a burning off

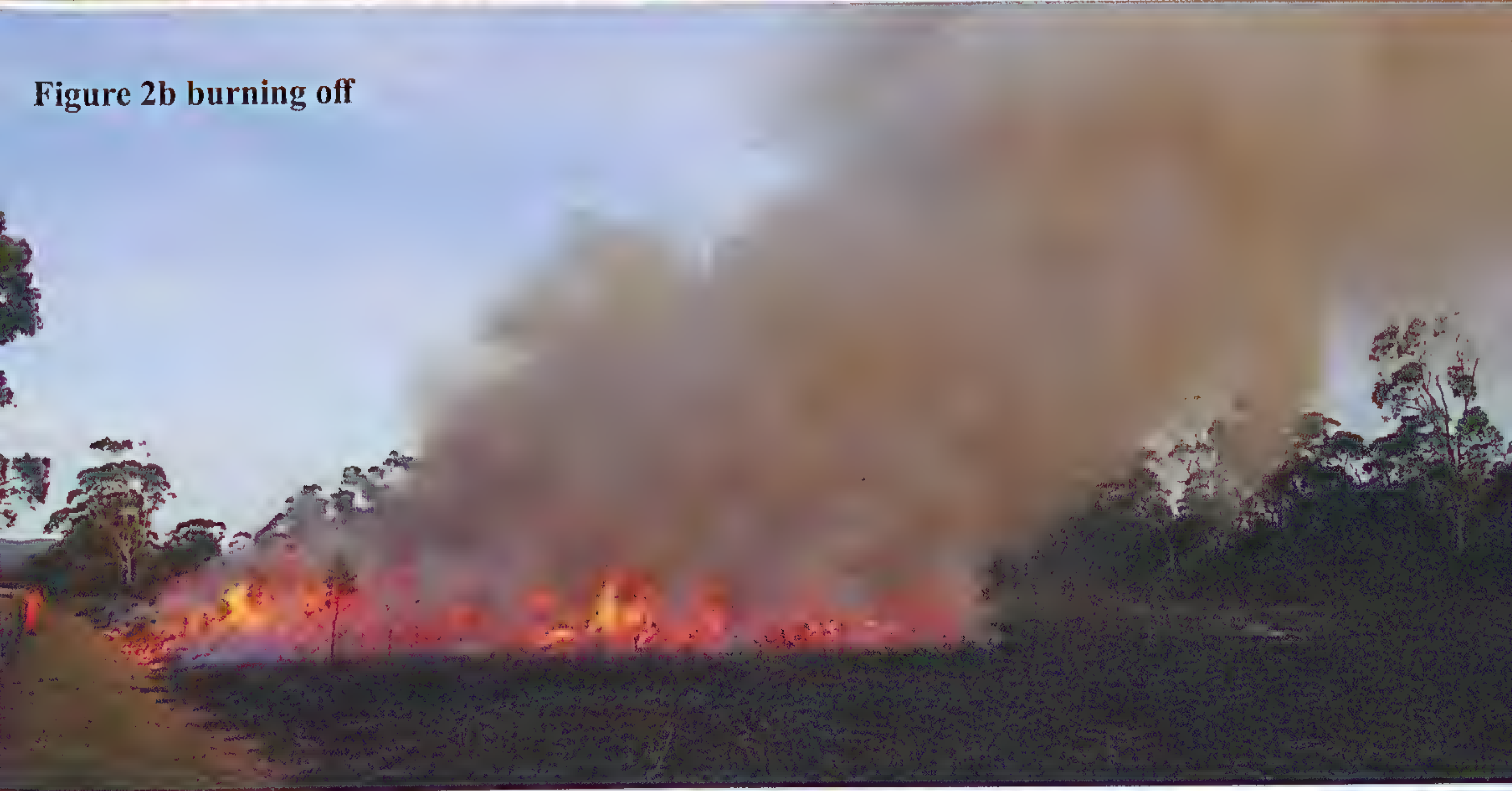

Figure 2b burning off

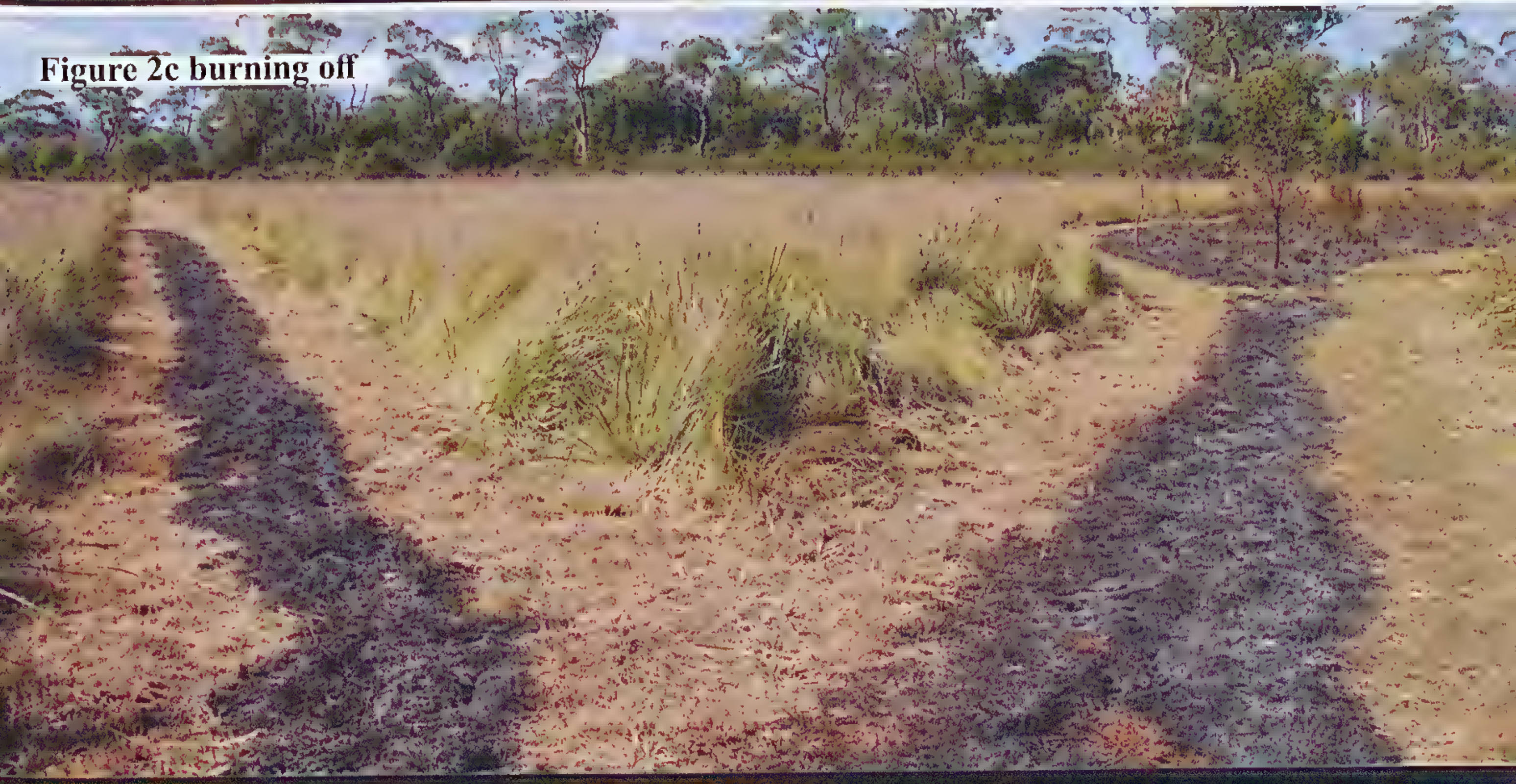

Figure 2c burning off

reverses the prevailing wind direction.

Planning, preparing fire breaks and controlling burns has been the most time-consuming activity in most years, consuming an average of 385 hours per year over the last 5 years. Second on the list is weed control with 335 hours per year. A burn plan needs a weed plan, as weeds tend to be the first to germinate and re-grow after disturbance. The main problems are local pasture plants/weeds, probably a legacy of past rough grazing. Monitoring, mostly orchids, and experiments consume about 280 hours per year, and managing vegetation around the house, plus tracks and fences uses another 190 hours. A further 125 hours a year is spent surveying. We have been surveying for fungi in recent years now that there are fewer new plant species to discover.

The Orchids (Figures 3,4,5)

The original NCP listed 160 indigenous plant species including 36 orchids. Seven species were listed as threatened including 5 orchid species - *Caladenia congesta*, *C. tonellii* (now thought not to be present), *Prasophyllum limnetes*, *P. pulchellum*, and *Thelymitra holmesii*. The equivalent counts today are 285 plant species including 57 orchids, still with 5 threatened orchid species following our discovery of *T. mucida*.

Many of the 57 orchid species on the property are relatively common, with representatives from all the larger genera in Tasmania. Eleven species are on the informal "watch list" at the Tasmanian Natural Values Atlas, some being possibly threatened, while others are data deficient. Some species, such as *Cryptostylis subulata*, seem to be sought after by local orchid enthusiasts, while to us they are common. Wet heathland habitat is perhaps not visited as frequently as drier habitats in Tasmania, which may explain why some species that we have abundantly are listed as scarce elsewhere.

Orchid Identification

To be effective managers, we need to know what orchids we are managing and we try to identify all orchid plants on our property even where there is some ambiguity matching them with species descriptions. This was particularly important for *Prasophyllum limnetes*, which is only known from the property. Its exact location had become lost in time, and early on we eagerly surveyed during each orchid season, especially in recently burnt places. An aberrant form of *P. rostratum* made us very excited one year, until a population emerged which matched the description of *P. limnetes* well. Despite flowering a month later, there was a resemblance to *P. rostratum* that made us uneasy. However, a morphometric analysis comparing measurements from *P. limnetes* and *P. rostratum* plants highlighted some significant differences and agreed with respective species descriptions. In summary, *P. limnetes* has a denser flower spike with many more flowers than *P. rostratum*. Renewed searches at the Tasmanian herbarium failed to find any other specimens that matched *P. limnetes*.

We have 22 *Thelymitra* taxa (sun orchids) on the property, included one taxon that is apparently unnamed. This is more than half of the 39 taxa listed for Tasmania. Some species are very fussy about sunshine, warmth, and humidity, in an unknown combination, and flowers remain firmly shut until their requirements are met. This is especially problematic on the north coast of Tasmania, where Bass Strait provides cool air conditioning when the wind is from the north. However, living on property with so many sun orchids provides a unique chance to compare species, and provides a wonderful spectacle of little blue flowers on those few days when the conditions are just right for flowers to open.

The task of identifying the *Thelymitra* species has been made much easier by the recent revision of the *T. pauciflora* group. Whilst we are now confident with naming *Thelymitra* specimens on our property, plants still tend to look much less familiar elsewhere. We remain cautious about the distinctions between some species, and present below a conservative informal taxonomy with some species and taxa combined:

Thelymitra juncifolia (broad sense): There are *T. juncifolia* or *T. ixioides* plants, based on column characters, but there seems to be a continuous spectrum between the two with no obvious ecological or other correlates. This is compounded by upper flowers sometimes having different morphology from lower flowers in the same raceme. There is a group of plants with very sparse

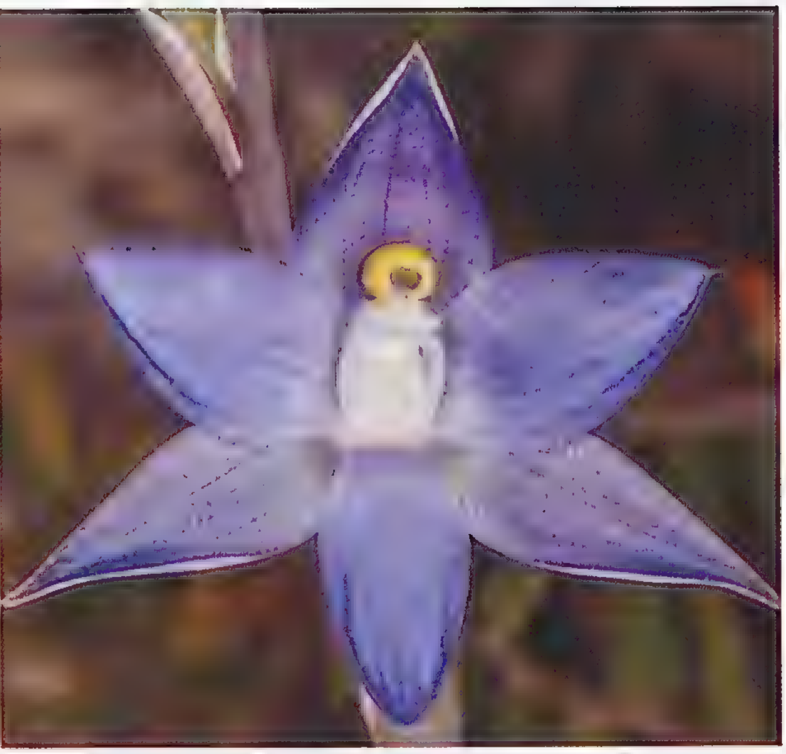

Figure 3a
Thelymitra arenaria

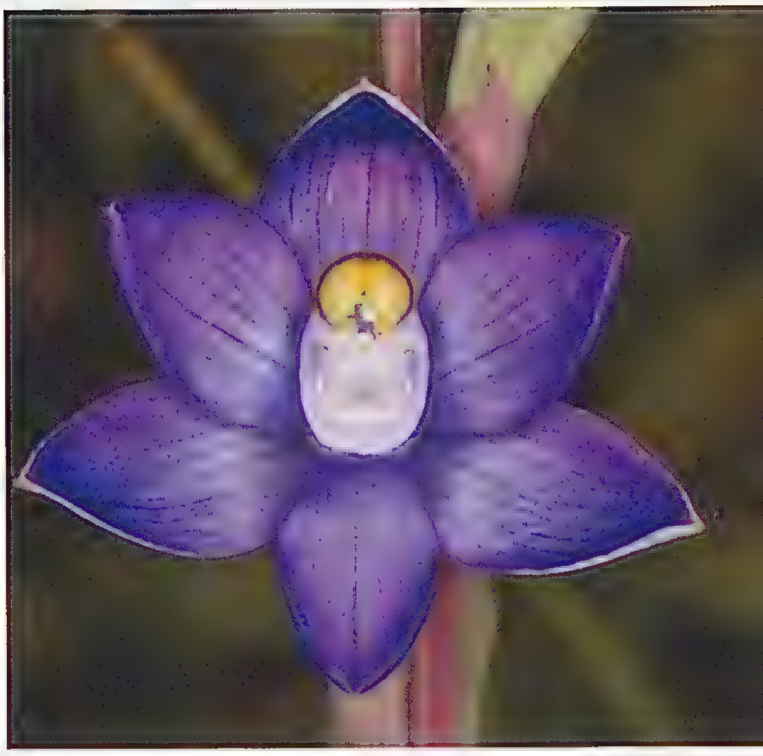

Figure 3b
Thelymitra paniculata

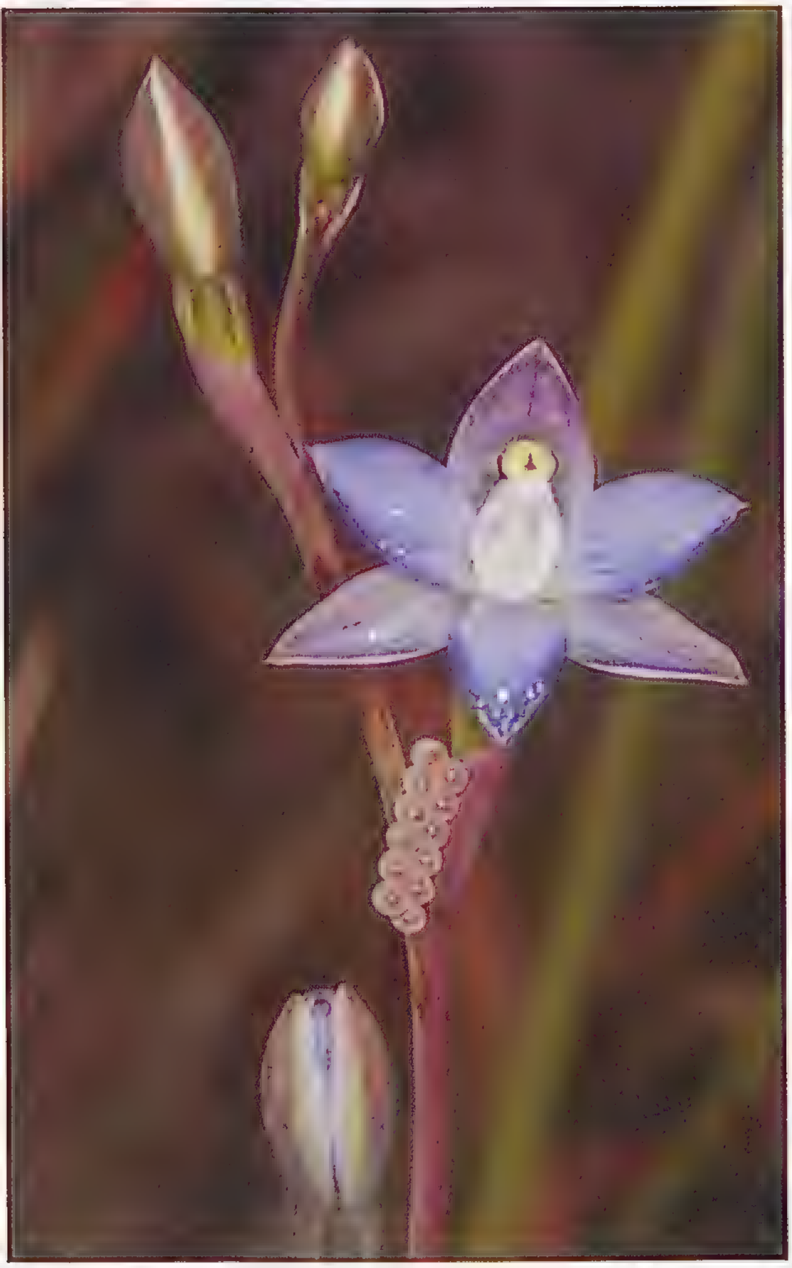

Figure 3c
Thelymitra pauciflora

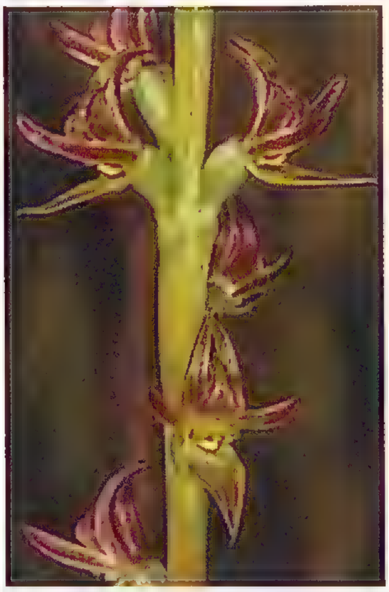

Figure 3d
Prasophyllum rostratum

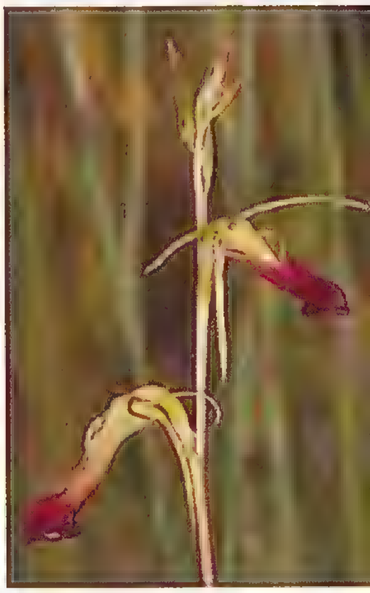

Figure 3e
Cryptostylis sp.

Figure 3f
Orchid monitoring

to no hairs on the lateral lobes, which key out to *T. sparsa*, but these are probably better lumped into a broader concept of *T. juncifolia*.

Thelymitra simulata (broad sense): We can identify some plants as *T. simulata* or *T. spadicea*, most easily determined by the colour of the mid-lobe of the column. *T. simulata* has a dark brown apex with little or no yellow on the rim, while *T. spadicea* has a largely blue mid-lobe with a distinct yellow rim, with only a few plants having confusing mixtures of these two characters. However, the distinguishing character in the two species' descriptions is a ruminate (*T. simulata*) or smooth (*T. spadicea*) mid-lobe of the column. In our specimens, the brown colouration is often ruminate, and the blue is often smooth. However, the ruminate character is less clear cut than the colour difference, and these two taxa may be better thought of as varieties.

Thelymitra peniculata (broad sense): Two forms are recognised. *Thelymitra peniculata* "purple" is a relatively robust member of the old *T. pauciflora* complex. *Thelymitra peniculata* "green", is very similar morphologically, but is an unambiguous green colour variant. Vegetatively *T. peniculata* "green" plants are wholly very pale green, and tepals are always white with fine pale blue spots. However, the two forms of *T. peniculata* sometimes grow together in a cluster of plants.

Apart from the discussion above, *T. arenaria*, *T. brevifolia* and *T. pauciflora* sometimes confuse us. *Thelymitra brevifolia* is potentially the easiest of the three to recognise, although its flowers are very reluctant to open during its relatively early flowering period. Reddish-brown on the mid-lobe of the column, pale blue tepals and wide thin reddish leaves are characteristic, but not entirely consistent. Robust *T. arenaria* plants are exclusive to our drier woodland habitats, but there are some smaller flowered plants with a very similar flower morphology that extend to wetter sites. Also, amongst the smaller flowered *T. pauciflora*, there are a variety of flower morphologies and habitats occupied. This group may not be completely worked out yet, with understanding of some variants still uncertain.

Orchid monitoring and experimentation

We aim to learn about the effects of management activities, and the demographics of threatened orchid species and *Thelymitra* species on our property. Dormancy is a key demographic issue for terrestrial orchids, which is at least partly under management control. There are records of orchid plants not appearing above ground for a year or more, and then re-emerging when conditions are suitable. While prior research in Australia generally suggests that two or three years is a typical maximum period for terrestrial orchid dormancy, it is likely that some populations can somehow survive for extended periods underground.

Secondly, aboriginal people lived in central north Tasmania for millennia, and burnt the country from time to time resulting in some orchid populations being disturbed by fire, while others remained undisturbed. How should we manage the remnant populations of threatened orchids that are now largely confined to our land? Our current answer is that we should encourage flowering, because this can lead to fruiting, and this is the only process by which populations can potentially increase. This is consistent with the original NCP that specifies periodic burning. However, it comes with risks: can we exhaust plants by "forcing" flowering and potentially reducing dormancy? It is likely that different species have different preferences and risks.

The monitoring methods we use are well established and used at multiple populations in Victoria. We learnt the technique from Drs Fiona Coates and Mike Duncan during one of their monitoring field trips in 2008. The general method is called "mark (or capture) and re-capture". Individual orchid plants are marked with a numbered tag that is pinned to the ground a known distance and direction from the plant. These sites are visited annually or more frequently to observe and/or measure features of the (re-captured) plant, or record the absence of a plant. A time machine would be a useful addition to this method, because it would be nice to know the history of a newly marked plant of interest. Unfortunately, at this stage we can only run time forwards, and peering backwards in time relies on retrospective analysis of monitoring data. In addition to monitoring and analysis, we also conduct some experiments, e.g. by caging some marked plants to investigate possible grazing pressure.

One of our early experiments has attracted most interest. The contemporary folklore was that the act of touching an orchid made native animals curious: "what's this funny human smell?", and because of this they ate the orchid plant. We conducted an experiment where we deliberately touched 60 marked plants, and left another 60 marked plants untouched. The results were clear, there was no significant difference in grazing between touched and untouched plants. Our post-hoc analysis revealed that plants along the track, touched or untouched, were significantly more likely to be grazed than those in the bush. Animals are using our tracks and snacking along the way.

Orchids that emerge and flower in a recently burnt site are very vulnerable to grazing. In shallow depressions, the normally dominant tussocks and shrubs are slow to re-grow until the following summer. Orchids and other smaller plants that exploit the temporary clearance tend to be both fleshy and easily available. Numerous caged-uncaged experiments aimed to determine whether caging individual plants after a burn enhances their flowering. The results generally indicate no significant difference, although we have yet to combine all our experiments in a meta-analysis.

Most of our monitored orchids have linear flat or tubular leaves, which are quite slender in non-flowering specimens. Searching for these leaves amongst copious other grass-like vegetation requires dedication, but we are often able to discriminate the species of infertile leaves after our 10 years of experience. Unequivocal data from the monitoring shows that flowering levels for all species peak in the second year following disturbance, which accords roughly with "after a hot fire" often stated in orchid folklore. The delay until the second year may be associated with our need to burn in late March to early April, which is perhaps too late for plants to be stimulated to flower in the same year. Some plants have already produced their new leaf when we burn. The leaf tip is then singed by the fire, but not killed because leaves grow from their underground base.

In 2014, all available monitoring data was analysed, and it was found that in the second season following a burn more plants emerge from dormancy compared to those that become dormant. We repeated the analysis using data from the 2015 flowering season, and found the opposite effect. Exogenous factors like rainfall or temperature could be alternative explanations for these effects. In total, very little dormancy is seen on the property compared to that sometimes reported in the literature, meaning that when a plants fails to emerge it is likely to be dead.

We are concerned about possibly exhausting plants that we have forced to flower by disturbance. Analysis of data about flowering and/or fruiting plants aggregated over all our *Thelymitra* spp. shows that approximately the same proportion (13% to 15%) of infertile, flowering and fruiting plants fail to emerge in the following year, and the more robust plants in the previous year are much more likely to be the flowering plants in the current year. In summary, there is no obvious indication that flowering is bad for plant health. We also find that when plants emerge from dormancy 10% are flowering plants, which can be compared with 28% of emerged plants being flowering plants in the complete data set. Therefore, the display of flowering orchids following disturbance consists mostly of plants that had emerged in the previous year, rather than plants that were dormant in the previous year.

Weeding

Weeding isolated infestations in the interior of our property is a priority for us, and we have had success in eliminating some infestations. One of the threats to the property is weeds that probably spread from neighbouring farmland into our adjoining wet heathland, most especially the habitat for *P. limnetes*. We have set out experimental weed control plots in one affected area. Immediately following a burn, we treated each of four different plots as follows: spray with glyphosate, scorch with a gas flame torch, hand weed, and do-nothing (control). The first two treatments can be scaled up for use with a tractor. Spray was effective in controlling perennial grasses, and the torch was effective for killing trefoil seedlings. However, five years after the initial control treatment, all treatments reverted to much the same weedy condition. As expected, one-off weed control is insufficient for long term weed management. We have, however, used the scorch treatment successfully after a burn elsewhere, with hand weeding follow up. Perhaps

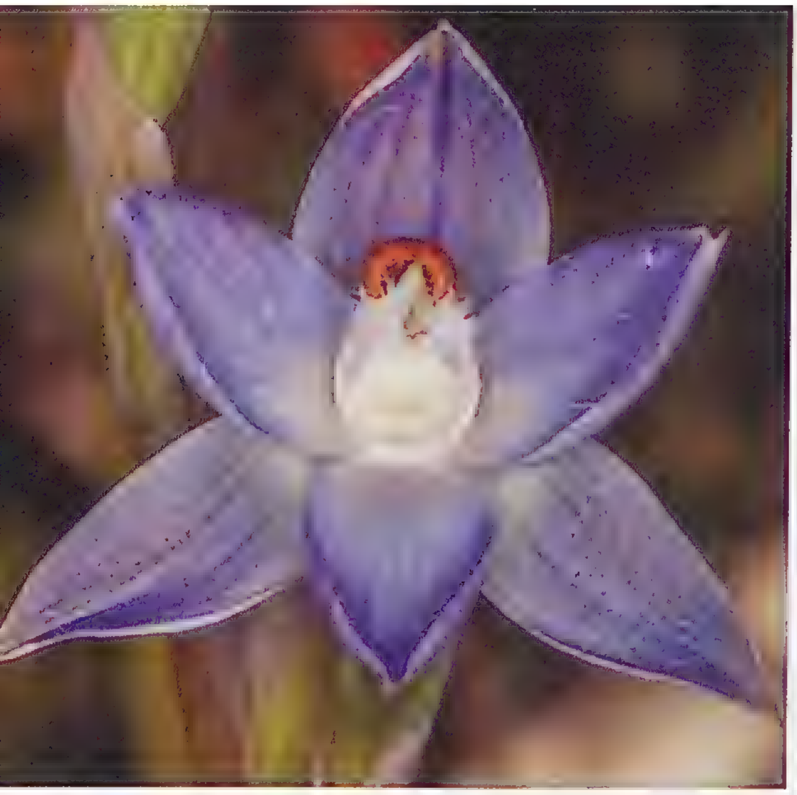

Figure 5a *Thelymitra brevifolia*

the most heartening outcome was that there was no evidence of collateral damage to native species from the spray treatment, when spraying was done 4–6 weeks after a burn and most native species had not yet re-emerged.

Concluding Comments

This is a case study of how an orchid hot spot can become a Private Protected Area with a Conservation Covenant and how we became the fortunate owners. Managing precious threatened orchid species in their natural habitat has presented us with challenges and a steep learning curve, including species identification. We have made a considerable effort to study the effects of our management activities, and we describe some of our initial conclusions.

There is much to learn about orchid demographics and management methods. We urge other people who are keen on orchids to keep records about their local orchid populations and to share them with others, especially those orchid species that are subject to disturbance or other management interventions. Methods are becoming well established now for those people who wish to take a rigorous approach.

Acknowledgements

Some of the work reported here was supported by funding from the Australian Government. We are very grateful for this support. We have not included references in this paper; interested readers may contact us for more information.

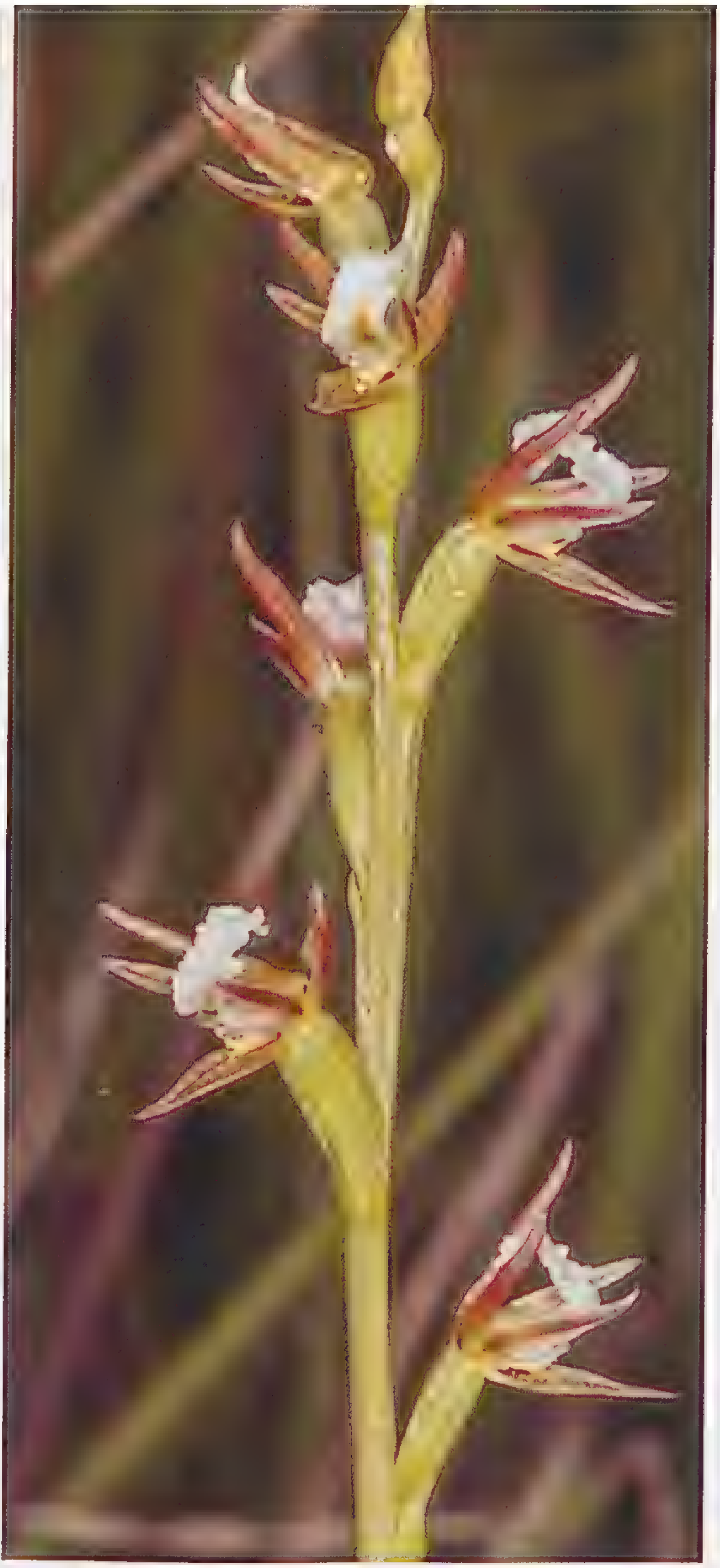

Figure 5b *Prasophyllum pulchellum*

Phil Collier has interests in the taxonomy of native flora, managing conservation land for the benefit of threatened flora and leaving a legacy of increased knowledge about land management methods and their benefits. Robin Garnett enjoys learning about the amazing interactions in the living world and sharing new knowledge.

Tropical Australian *Dendrobium* Primary Hybrids

Text Mark Nowochatko
markn@nqld.net
Photographs Bruce Gray

I began growing orchids back in the 1970s and Australian orchids have always been my focus. I still remember going with my father in the old EH Holden to the Blackbutt Ranges, southeast Queensland, to salvage plants off trees that were being cleared for plantation forestry. Two of the plants collected then are still growing on yard trees at my parents' place in Brisbane; *Dendrobium speciosum* and *D. teretifolium*. A piece of the *D. speciosum* is in my own collection up in North Queensland.

It was after I moved to North Queensland in 2003 that my interest in species and primary hybrids grew. Native primary hybrids are not readily available from the commercial orchid nurseries so I embarked on my own breeding program. In my early days of flasking, the flasking and replating process proved relatively easy; it was the deflasking process that was the challenge. At the start loss rates were astronomical, but I learned. Today the success rate is much better. I harden the plants up by exposing the flasks to natural light for several weeks before deflasking and use "Previcur®" fungicide in a wash for plants as they come out of flask. The community pot media is perlite, fine charcoal and coconut peat. I think the key thing has been to use "Previcur®" fungicide in the water used to expand the peat.

One of my first primary hybrids was *D. antennatum* x *D. discolor* (*D.* Verninha) (Fig.1). Due to poor deflasking results back then I only have four plants of this cross. I can see traits of both parents in the plant growth but they did not flower until they were large plants. A couple of years later I remade this cross but with *D. discolor* as the pod parent (Fig. 2). They grew well and have flowered on much smaller plants. I have come to the belief that the pod parent has a significant impact on the progeny. This is best demonstrated in the cross *D.* Megan's Charm (*D. johannis* x *D. bigibbum*). While the growth habits are similar, the flowers are very different. Figure 3 is with *D. johannis* as the pod parent, and Figure 4 is with *D. bigibbum* as the pod parent. Both are good growers and prolific flowerers. Plants from the *D. bigibbum* pod parent have a strong sect. *Phalaenanthe* influence in the shape and *D. johannis* has added a velvety lustre to the flowers. The plants from the *D. johannis* pod parent are much more open with floppy segments, while the colour is similar but lacks the lustre of the reverse cross. This hybrid has the potential to occur naturally as both species grow together, but as far as I am aware it has not been found in the wild.

Dendrobium trilamellatum x *D. bigibbum* (*D.* Steven Kami) has produced plants and blooms very like *D. johannis* x *D. bigibbum*. Where I used the smaller southern form of *D. trilamellatum* (syn. *D. semifuscum*) some plants have produced a nice yellow splash in the labellum. I will make the reverse of this cross to add data for my pod-parent theory.

Dendrobium discolor x *D. trilamellatum* occurs naturally in the wild, and whilst the vegetative differences are subtle, when looking at the plants flowering in the wild I believe it is possible to pick which has a *D. discolor* pod parent (Fig. 5) and which has a *D. trilamellatum* pod parent. (Fig. 6). I have made this cross both ways and the *D. trilamellatum* pod plants have just started flowering. The *D. discolor* pod plants are at the community pot stage so a few more years are needed to see if my theory holds true.

Another primary hybrid found in the wild is *D. discolor* x *D. nindii* (*D.* Peter Petersen). Figure 7 is from a natural hybrid, a plant found in the Daintree area many years ago. Figures 8, 9 & 10 are from plants I bred. They are from the same seedpod with *D. discolor* as the pod parent. They are growing into very large plants with canes 2.5 – 3 m high, and with the vigour to do more. I finally have in flask the reverse cross *D. nindii* x *D. discolor*. I find that *D. discolor* is a nice promiscuous plant that readily accepts pollen from other species, but *D. nindii* is much fussier and does not readily hold pods made with pollen from other species.

Other primary crosses I have made utilising *D. discolor* include *D. carronii* x *D. discolor* (*D.* Valda), which has nice blooms on long racemes from relatively small plants, and *D. bigibbum* var. *compactum* x *D. discolor* (*D.* Judy Flere) (Fig. 11),

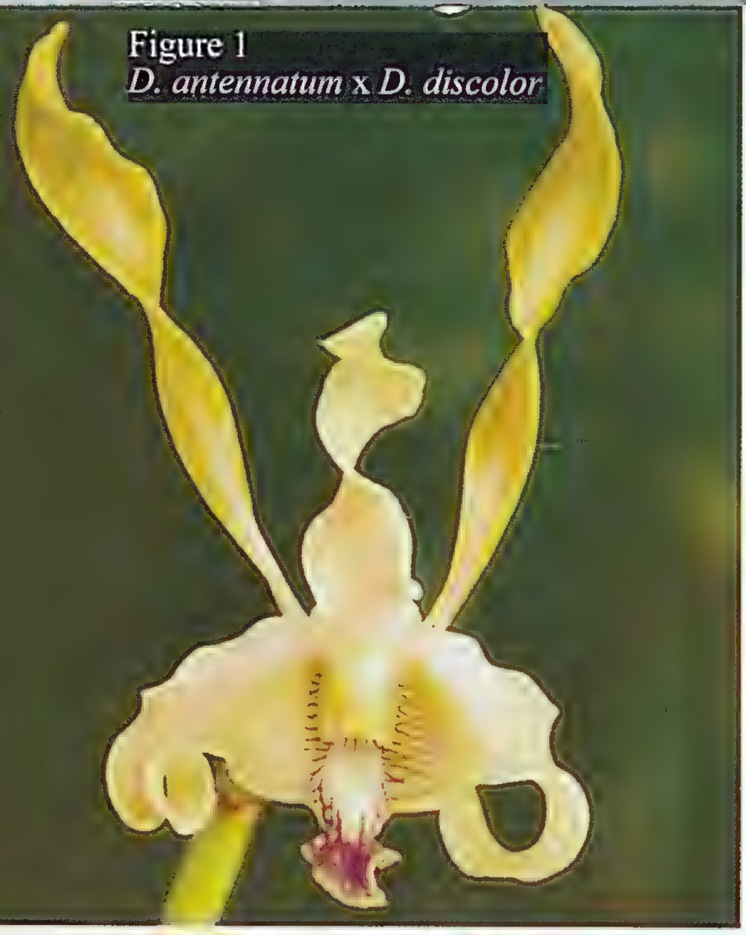

Figure 1
D. antennatum x *D. discolor*

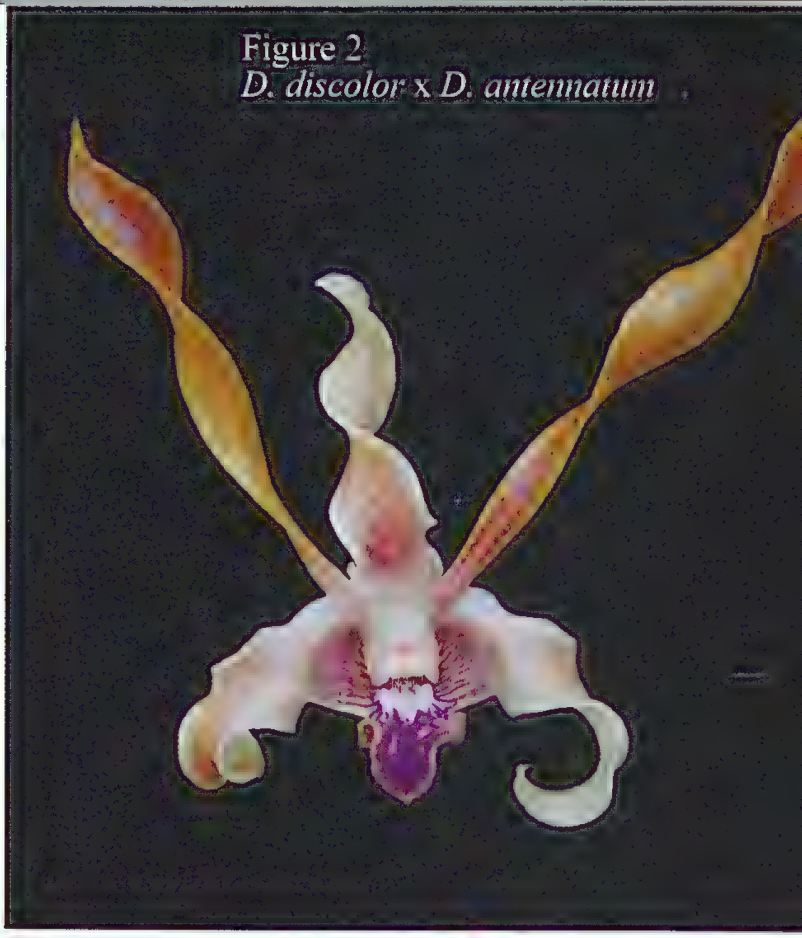

Figure 2
D. discolor x *D. antennatum*

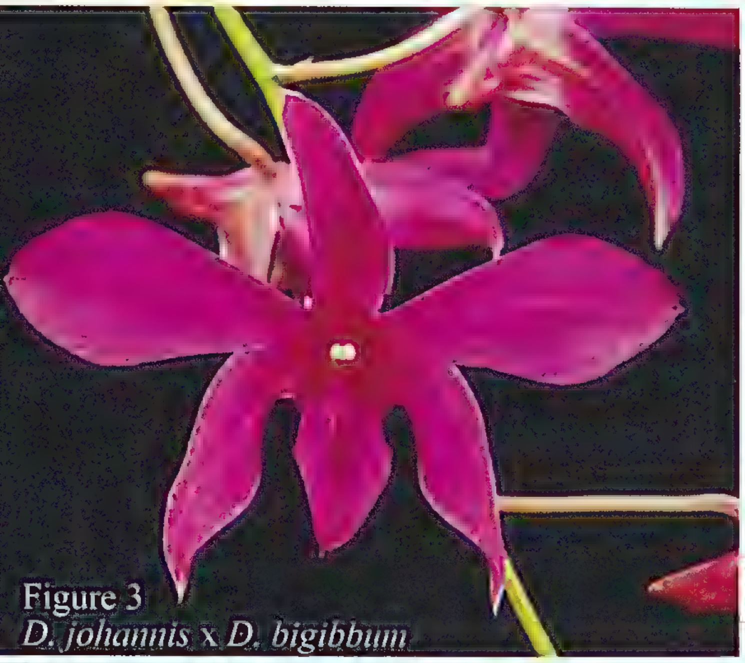

Figure 3
D. johannis x *D. bigibbum*

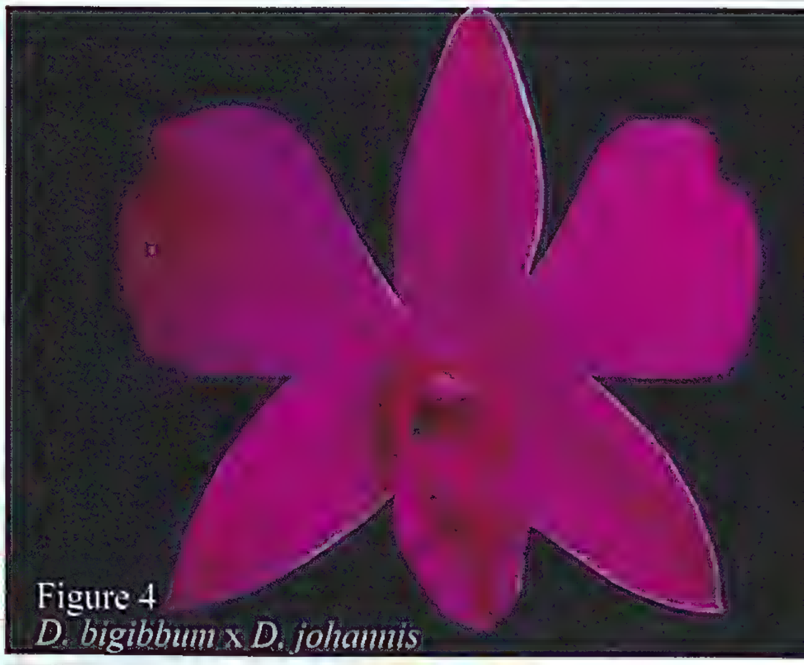

Figure 4
D. bigibbum x *D. johannis*

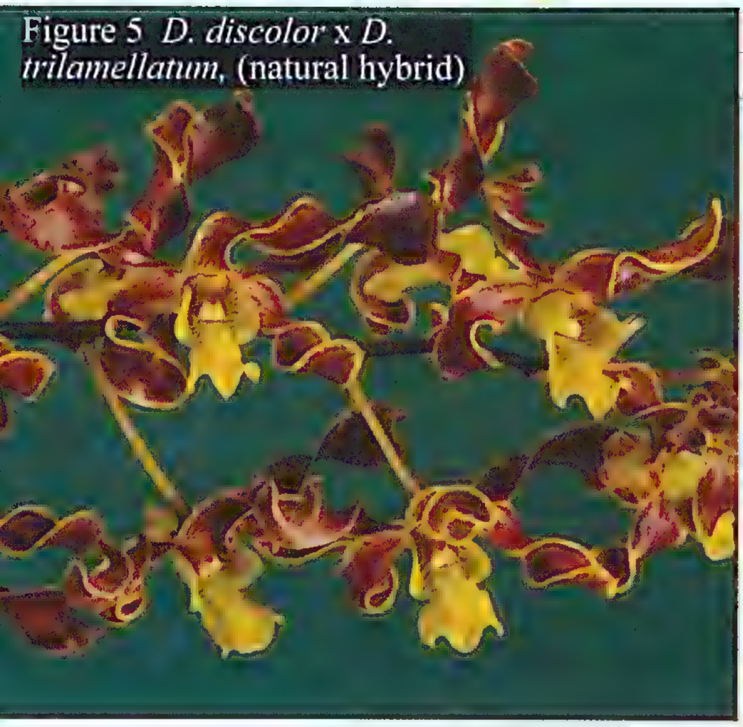

Figure 5 *D. discolor* x *D. trilamellatum*, (natural hybrid)

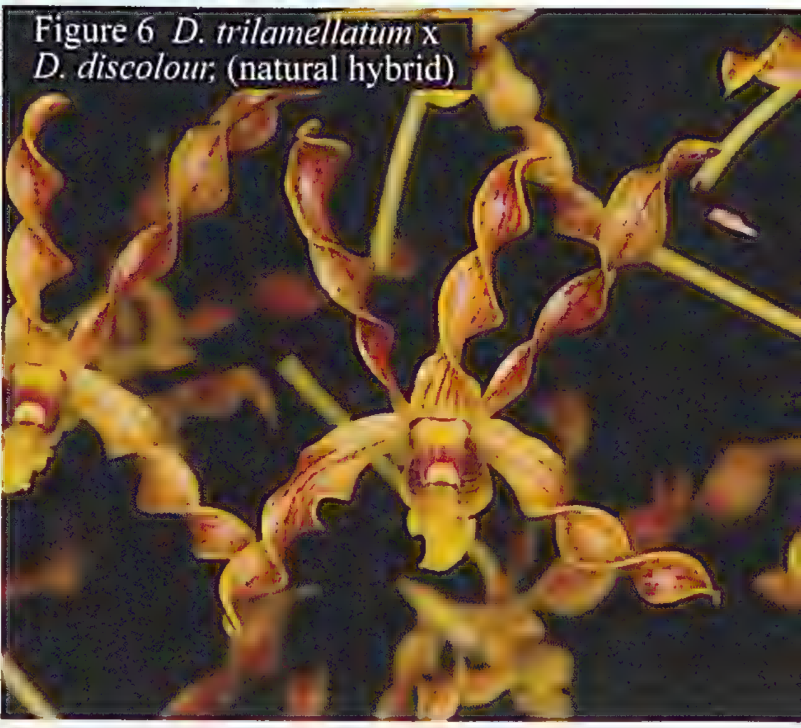

Figure 6 *D. trilamellatum* x *D. discolour*, (natural hybrid)

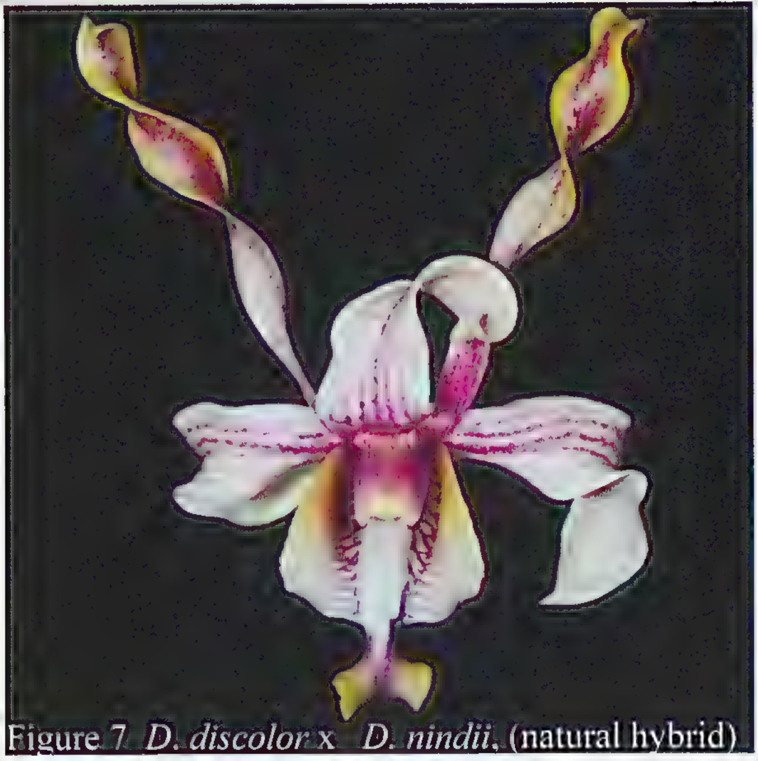

Figure 7 *D. discolor* x *D. nindii*, (natural hybrid)

which have bloomed off smaller compact plants with flowers distinctly different from most *D.* × *superbiens* (Fig. 12). This second cross has been found on the wild and was at one stage called *D. vinicolor*, a synonym of *D.* × *superbiens*. There are plants circulating in North Queensland purported to be from the original wild collection of this cross, but the plants I have seen do not look right. Over the years, perhaps labels have got mixed up and the error has been perpetuated.

Some other primary crosses utilising *D. bigibbum* include *D. bigibbum* var. *compactum* x *D. antennatum* (*D.* Albertine) (Fig. 13). This has produced early flowering plants strongly influenced by *D. antennatum*, with broadening of the segments and much less colour impact than I would have expected from a *D. bigibbum* hybrid. Also *D. bigibbum* var. *superbum* x *D. nindii* (*D.* Australia) (Fig. 14). These have strong growing semi-phalaenanthe type blooms in typical *D. bigibbum* mauve tones. The main influence of *D. nindii* has been to broaden the labellum and produce multiple flowerings during the year.

Dendrobium canaliculatum and *D. carronii* are good species to use in breeding because they generally reduce plant size and improve floriferousness. *Dendrobium bigibbum* x *D. canaliculatum* (*D.* Mini Pearl) has been found in the wild at least once (Fig. 15). It was my breeding of this cross (Fig. 16) that provided sufficient proof that the wild hybrid was indeed *D. bigibbum* x *D. canaliculatum*. *Dendrobium carronii* x *D. antennatum* has produced nice compact, free flowering plants in yellow/green colour tones. So far in the seedlings that have flowered there is little colour influence from *D. carronii* evident. The first two seedlings of *D. affine* x *D. carronii* (*D.* Frank Booth) cross have produced unusual mauve/pink toned blooms. I will need to get some photos next time these flower.

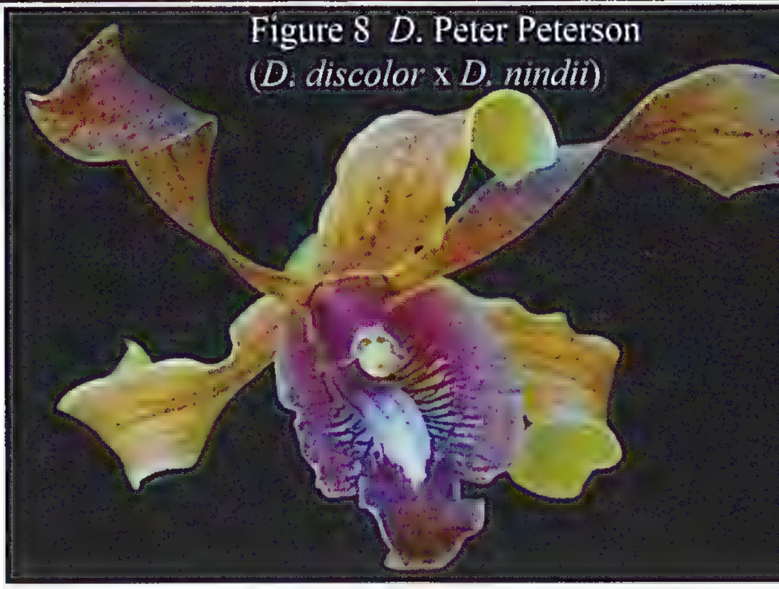

Figure 8 *D.* Peter Peterson (*D. discolor* x *D. nindii*)

Last spring proved to be a good pod set season and I have some promising hybrids germinating in flask. These include remaking *D. discolor* x *D. nindii*, finally getting a pod of *D. nindii* x *D. discolor* to hold (the seed has germinated), *D.* Peter Peterson x *D. carronii* (*D.* Cherub), *D.* Peter Peterson x *D. canaliculatum* (*D.* Son of Gloucester), *D.* Peter Peterson x *D. johannis* and *D. johannis* x *D. carronii* (*D.* Minnie).

Some of the other hybrids I have made previously and awaiting their first flowering include *D. tetragonum* x *D. antennatum*, *D. canaliculatum* x *D. aemulum*, *D. affine* x *D. johannis*, *D.* × *superbiens* x *D. johannis* (*D.* Three Star). With luck some of these may bloom next season.

In future seasons I will continue to attempt to fill the gaps on the reverse crosses so eventually I have comprehensive data on the pod parent influence in the hybrids I have made. The complex hybrids that are around today do not interest me much - Australian species (including natural primary hybrids) attract my interest. I like thinking what will be the result if I cross species A with species B. That is the challenge and appeal of doing your own breeding and flasking. Give it a go as it is not as difficult as you may think and it is very rewarding when a plant you bred blooms for the first time.

Mark Nowochatko lives in north Queensland and is particularly interested in primary hybrids utilising Australian species. He is an AOC judge and member of the Atherton Tablelands OS.

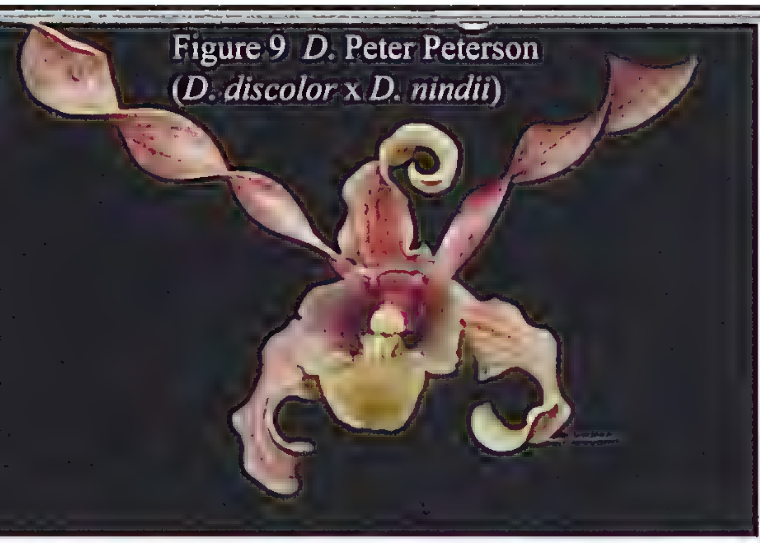
Figure 9 *D.* Peter Peterson (*D. discolor* x *D. nindii*)

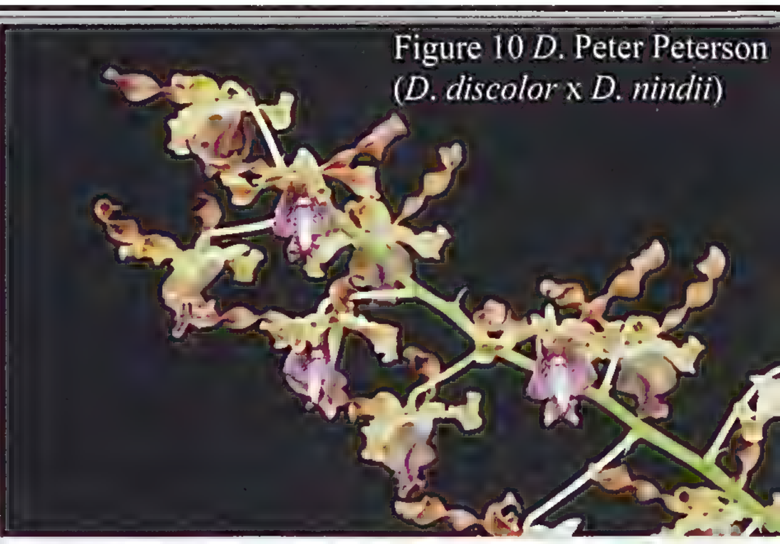
Figure 10 *D.* Peter Peterson (*D. discolor* x *D. nindii*)

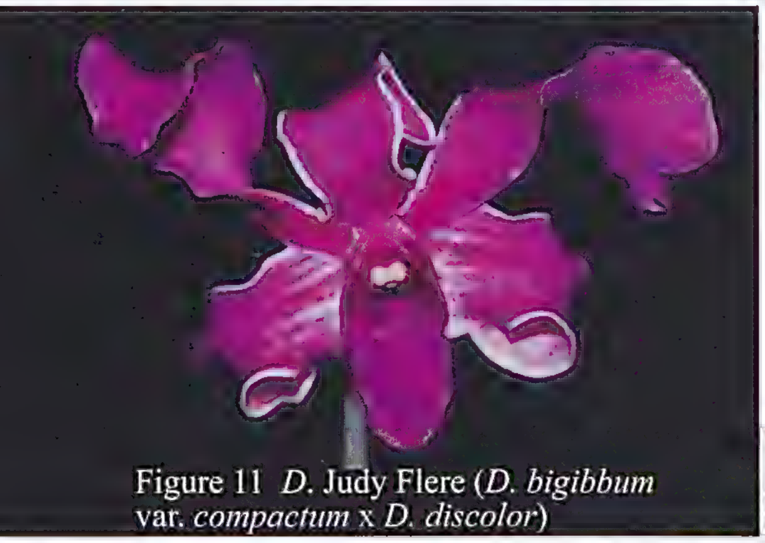
Figure 11 *D.* Judy Flere (*D. bigibbum* var. *compactum* x *D. discolor*)

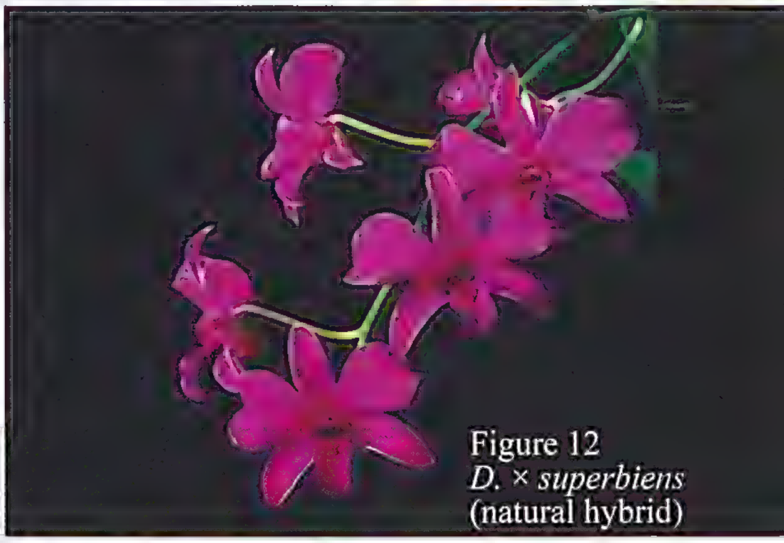
Figure 12 *D.* × *superbiens* (natural hybrid)

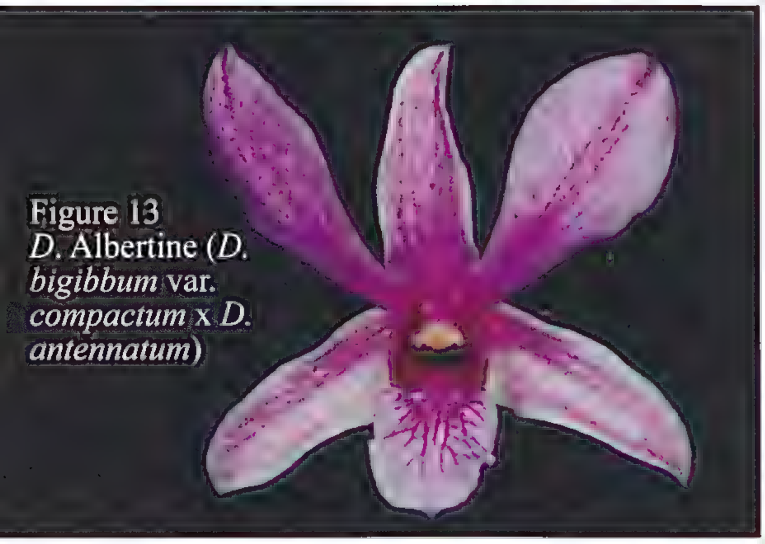
Figure 13 *D.* Albertine (*D. bigibbum* var. *compactum* x *D. antennatum*)

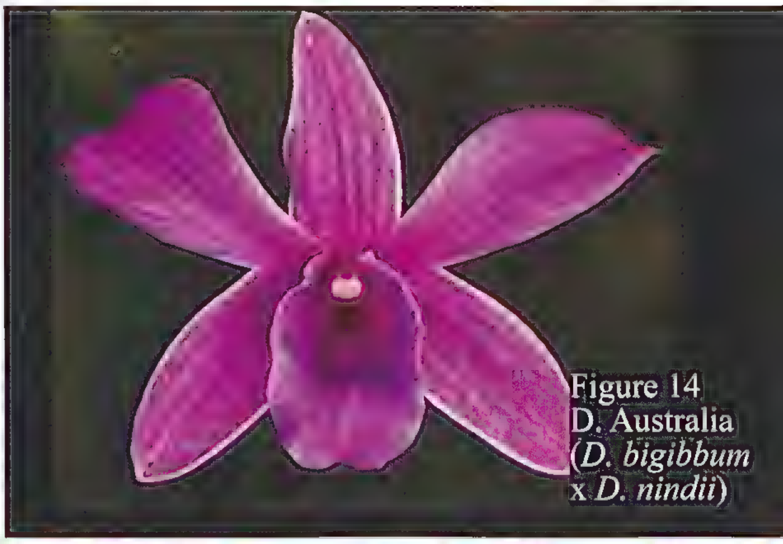
Figure 14 D. Australia (*D. bigibbum* x *D. nindii*)

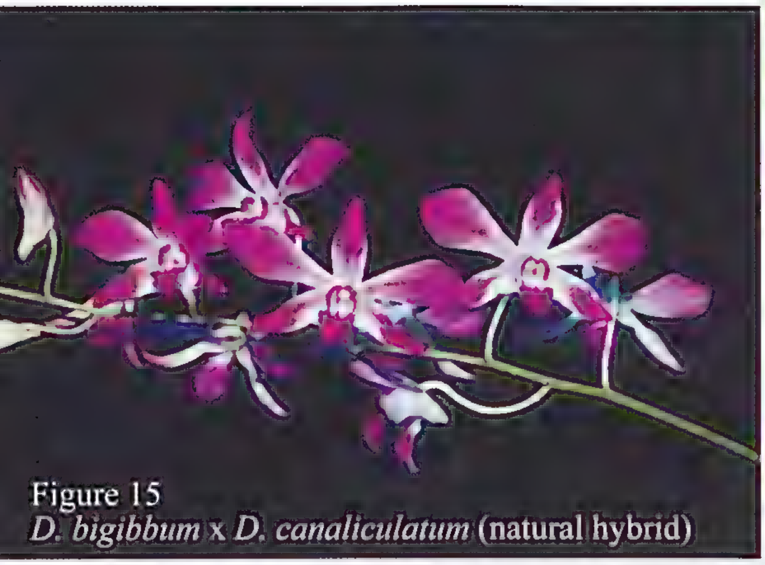
Figure 15 *D. bigibbum* x *D. canaliculatum* (natural hybrid)

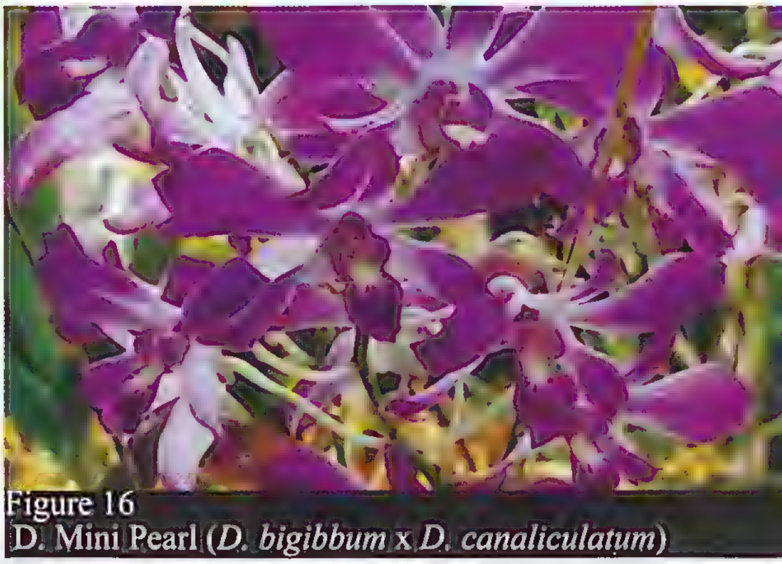
Figure 16 D. Mini Pearl (*D. bigibbum* x *D. canaliculatum*)

Vale Alan MacDonald Dash 15/5/1935 – 18/7/2017

Tony Clarke

Alan was a Life Member of ANOS Inc. having served as Conservation Officer from 1995 to 2005. During that time he was involved in two prominent conservation issues - the critically endangered *Diuris byronensis* which was threatened by a proposed development on the only known colony in heathland in Byron Bay, and 3 threatened orchid species (including the underground orchid *Rhizanthella slateri*) in the Bulahdelah bypass. Alan sacrificed a lot of his time attending to these sites showing his dedication to his role as Conservation officer ANOS Inc.

Alan was also a Life Member of ANOS Inc. Central Coast Group, being a long time Conservation Officer and Committee member. He was a keen terrestrial orchid grower and benched a magnificent display at ANOS Inc. Central Coast Groups annual spring show for many years.

Alan was a keen Scout in his younger years and obtained the Queens Scout award. He was also a member of his local Apex club, a founding member of Erina Rugby League Club, and a Rugby League Referee. He was a Discovery Guide for the National Parks and Wildlife Service where he helped establish a trek of the Great North Walk as well as becoming involved with local indigenous elders and became interested in indigenous culture . He was also keen in early European history in Australia.

He was a qualified Surveyor and in later years studied to become a Town Planner, in recent years Alan was awarded the Premiers Senior Achievement Award.

Alan was a generous and gentle man who will be missed by all who know and love him. He was a humble Aussie fellow, a great leader and the knowledge and passion he shared of the natural environment touched many people.

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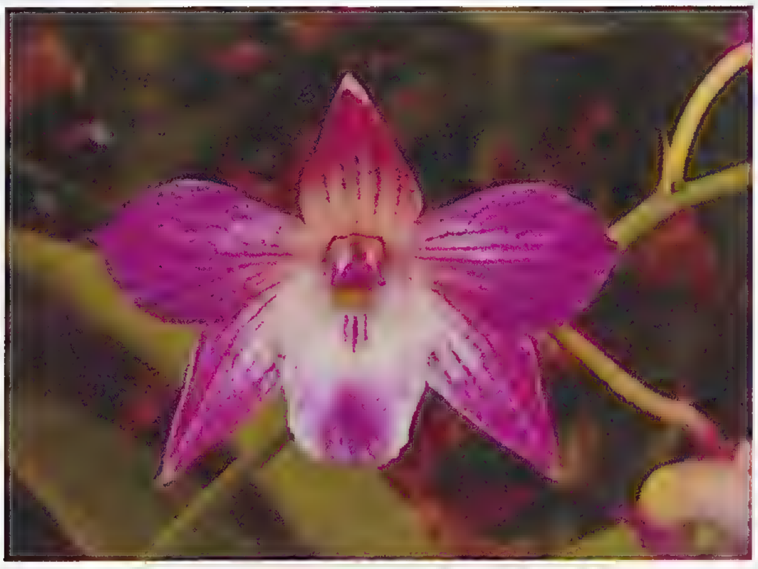
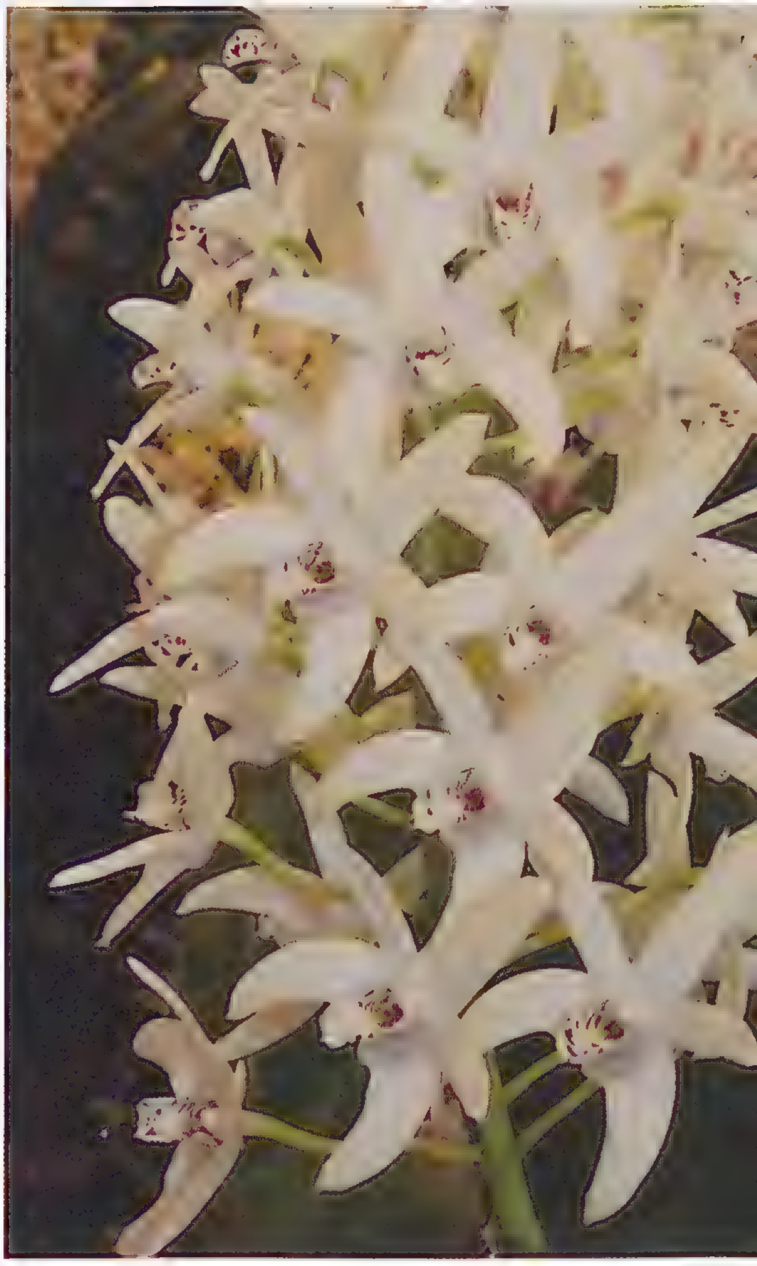
Kempsey Speciosum Spectacular

Text & photos by Peter Adams

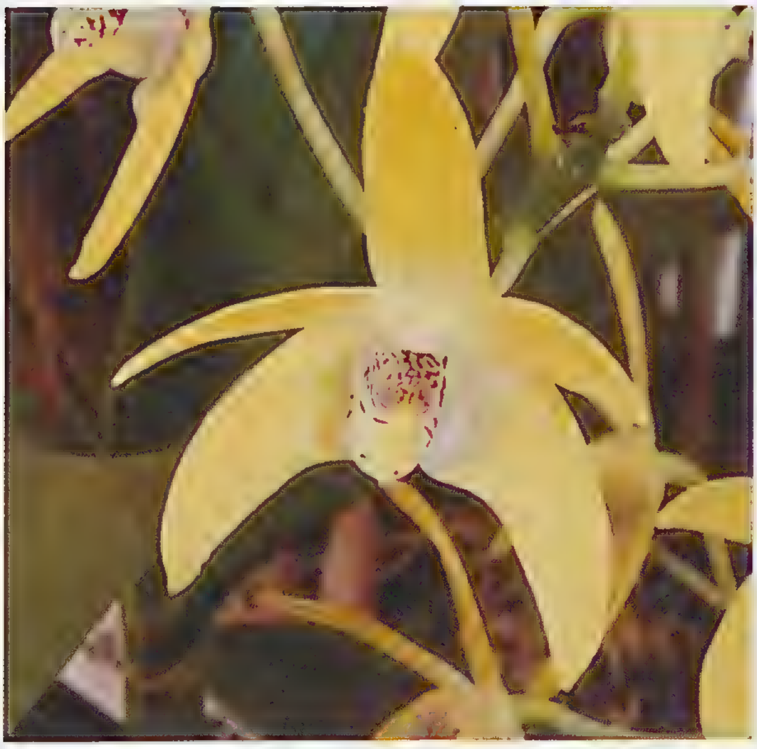
It was another successful year at Kempsey with the exhibition of outstanding plants showcasing the development of Australian species and hybrids, and a satisfying number of awards (10) at the show. Grand Champion Speciosum was *D. speciosum* 'Windermere' x 'Daylight Moon', an inter-varietal plant grown by Ted and Winsome Walmsley. Reserve Champion Speciosum was *D. speciosum* 'Palmerston Mist Mark'. Champion Hybrid was awarded to a yellow speciosum-style seedling of *D.* Duno Marilyn 'Brian' grown by Henk van den Berg. Both plants received quality awards and details of awards will be presented in the December issue of *The Orchadian*. In this issue we illustrate some of the other plants exhibited.



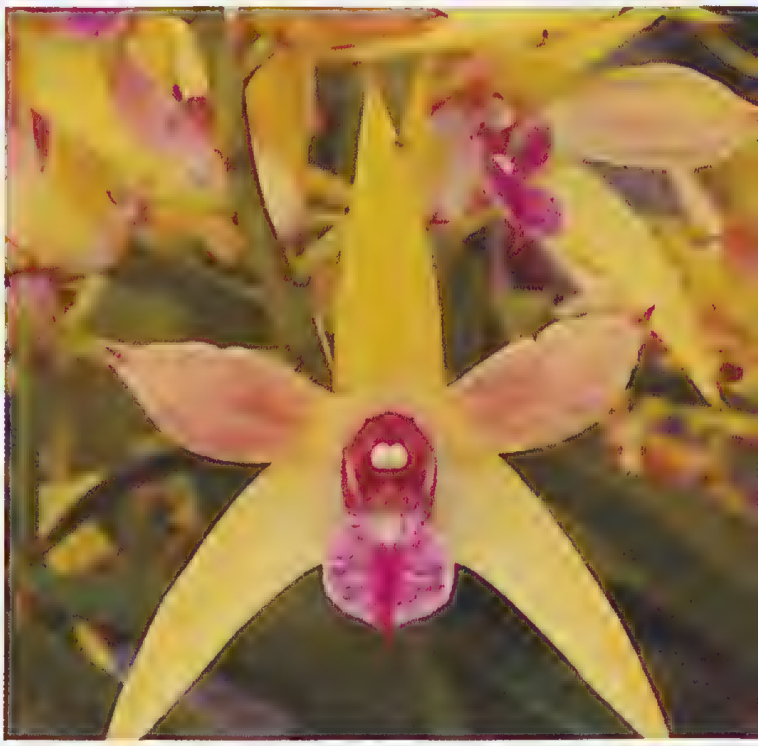
D. aberrans x *D. bigibbum* 'White', an unregistered hybrid



D. Wysper 'White Lies', owned by W. Perrin.



D. Dingadee 'Kaz', owned by W. Perrin.

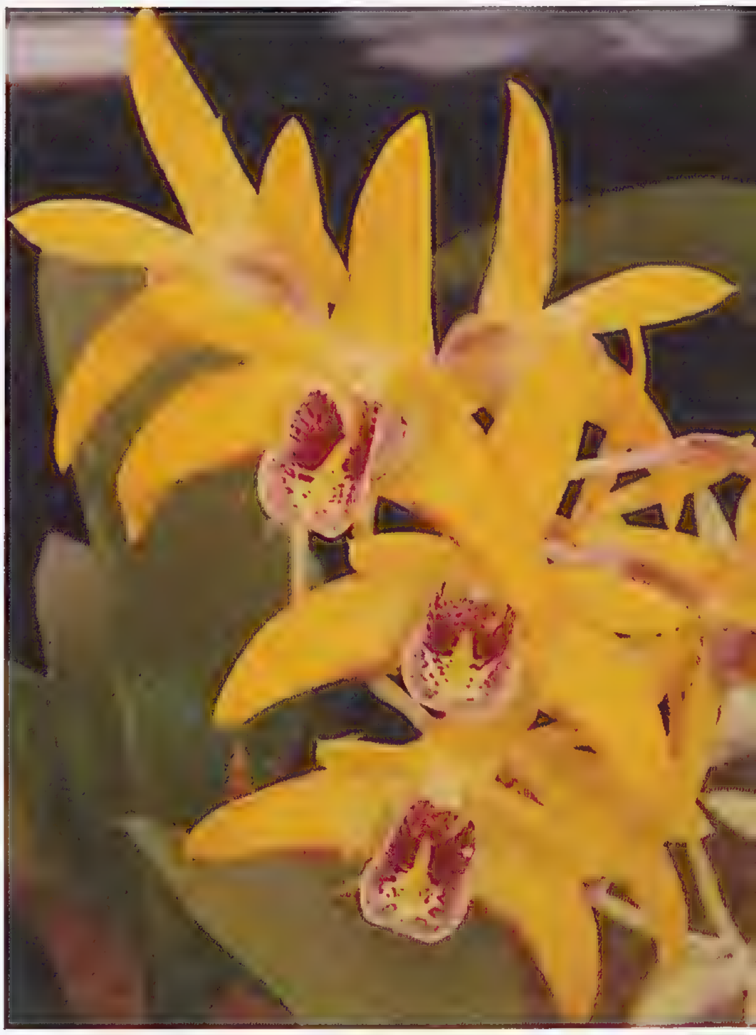


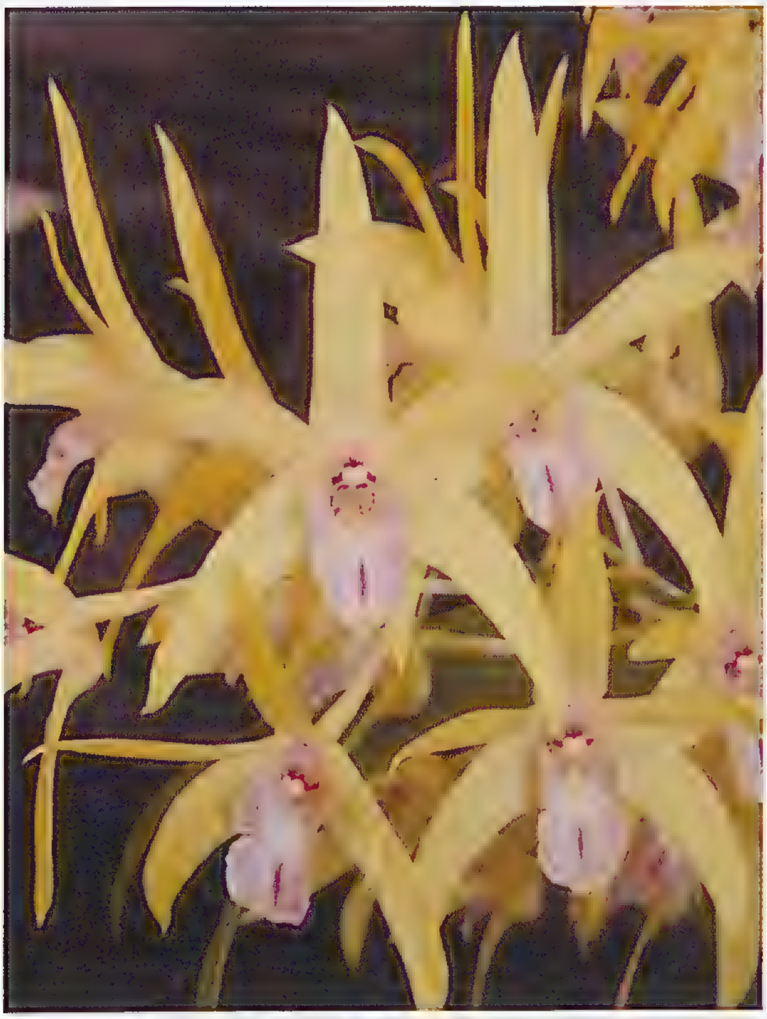
D. Jayden (*D.* Elegant Heart x *D. speciosum* var. *pedunculatum* 'Herberton').

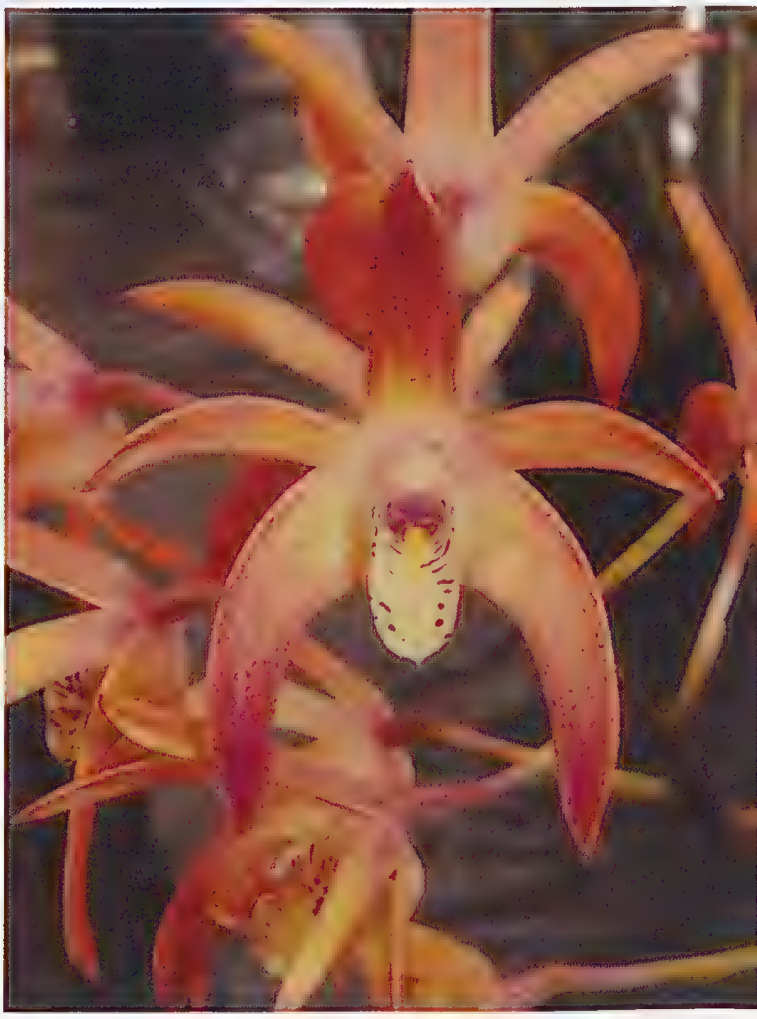
D. Warringah 'Karen' x *D. falcorostrum* 'Mal', an unregistered hybrid.

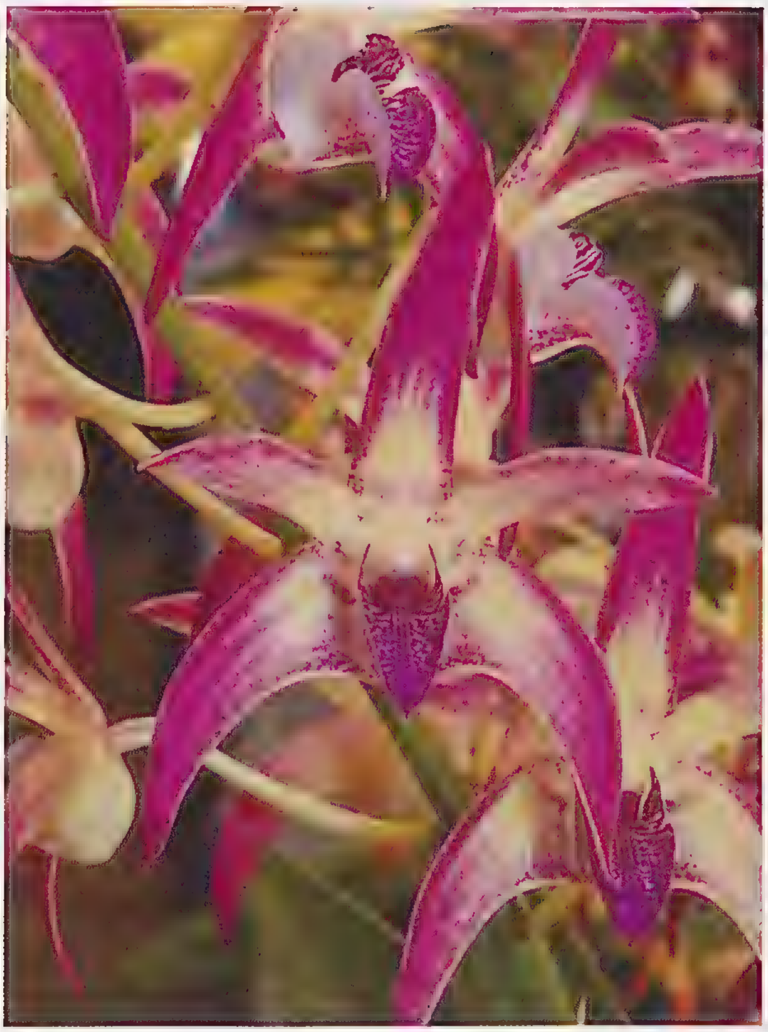
D. Dunokayla 'Last'.

ANOS Inc. Patron David Cannon.

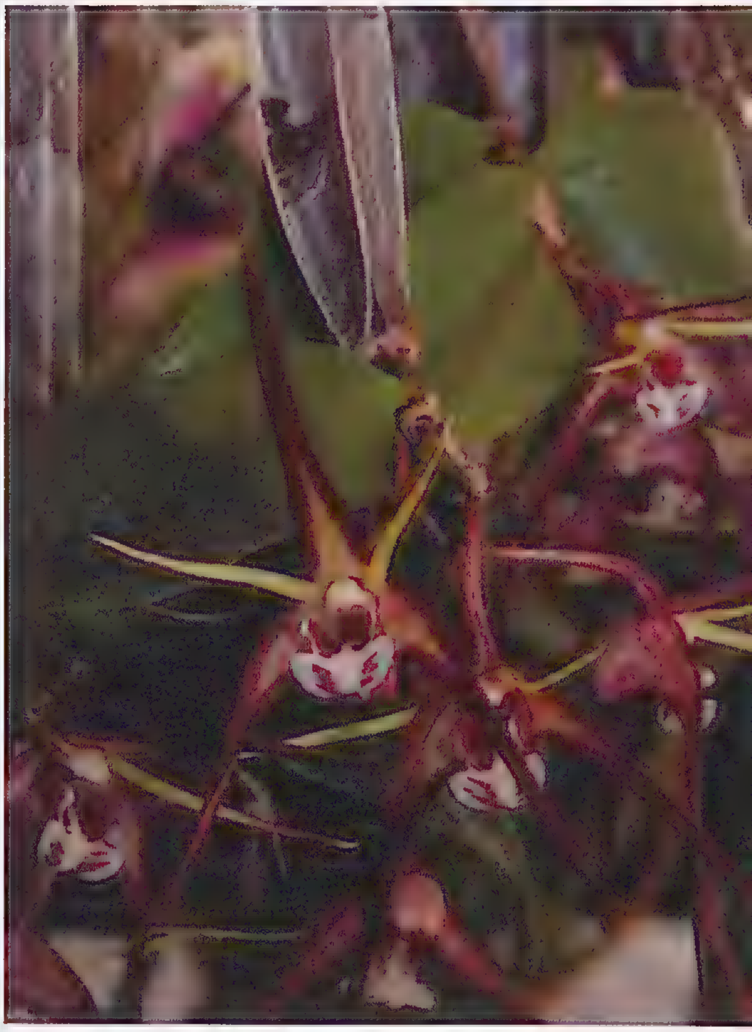

D. Katrin's Gold (*D.* Goldberg x *D.* Yondi Tina).


D. Jayden, owned by W. Perrin.

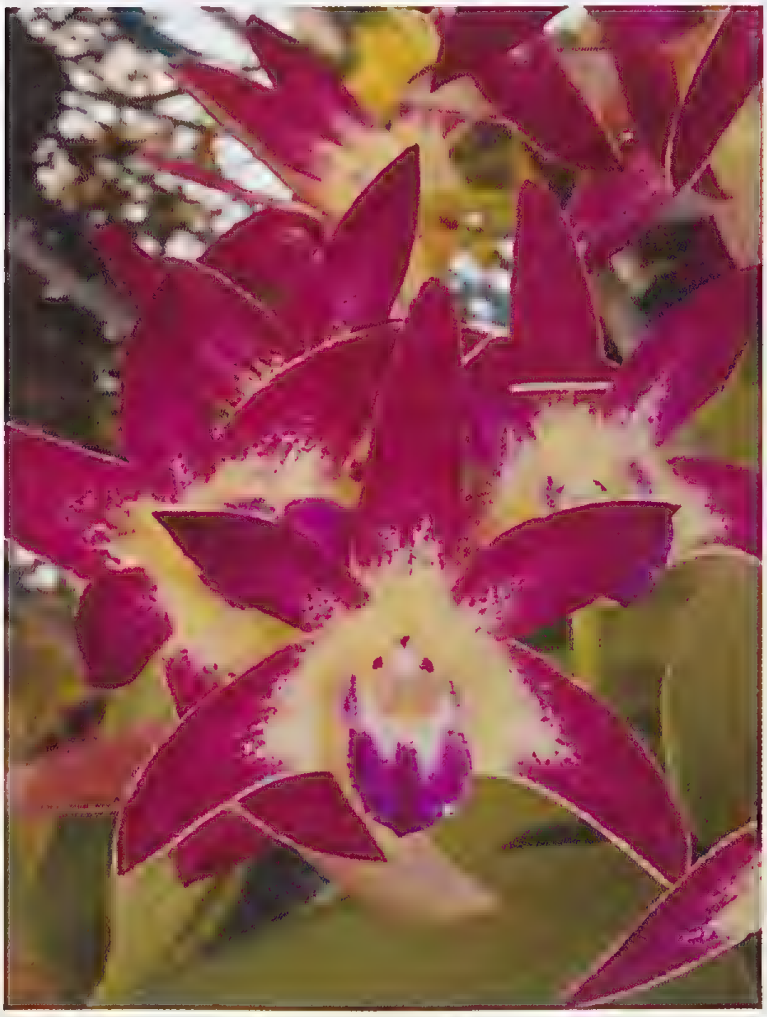

D. Australian Sheenamere (*D.* Sheena x *D. speciosum*).



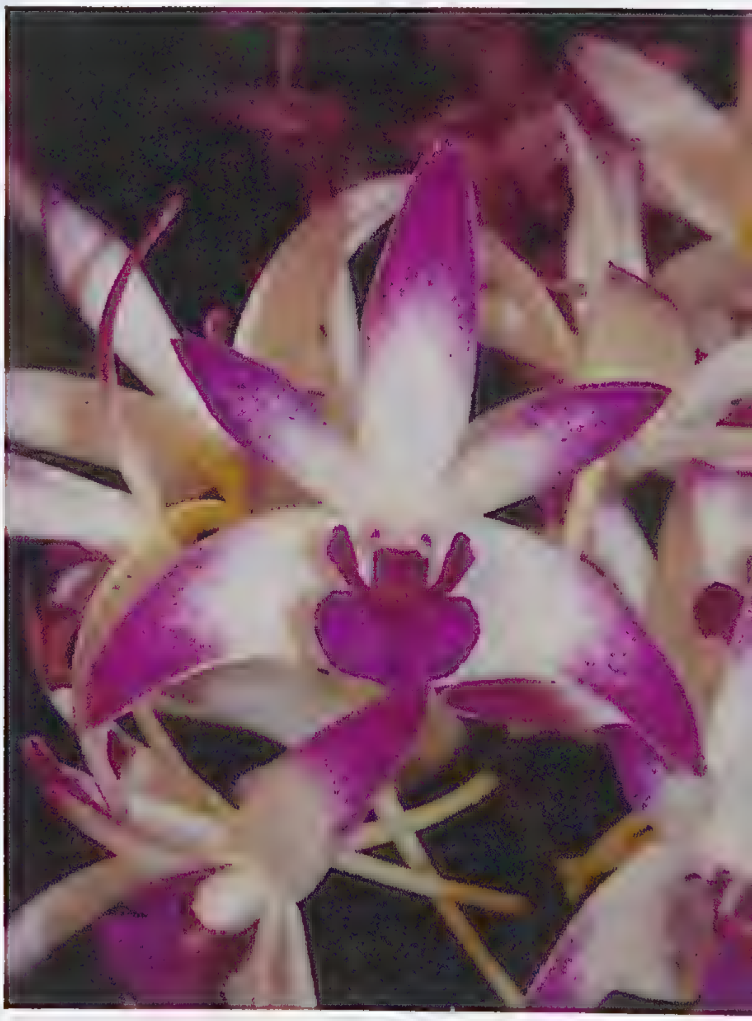
D. Copperhead Road (*D.* Intense x *D. speciosum*), owned by Fred Fear.



D. tetragonum var. *tetragonum* 'Bellingen', owned by D. Sinclair.



D. Jayquest 'Fred', owned by H. van den Berg.



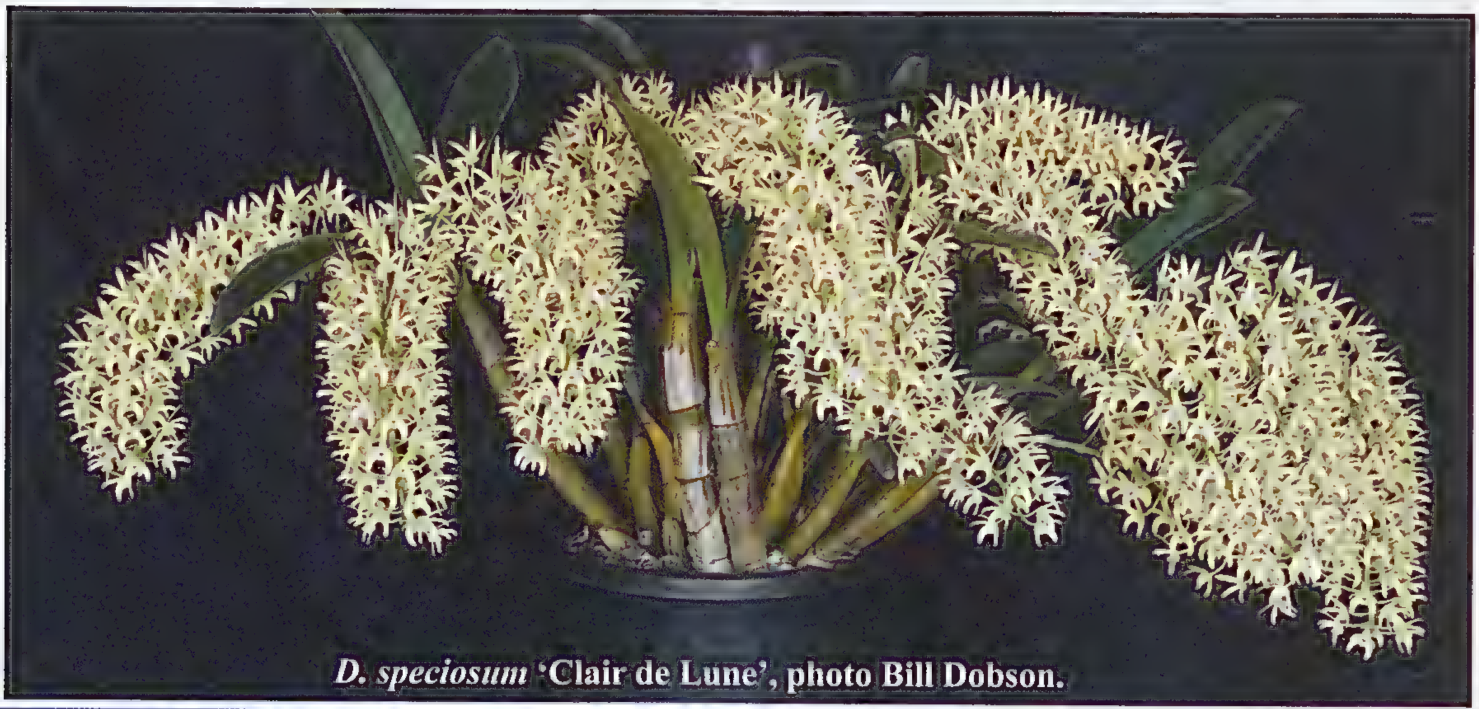
D. Class 'Pauline'

Another FCC Awarded by ANOS Panel

Peter Adams

Tony Blewitt received an FCC/ANOS as well as ACC/ANOS (cultural award) for his plant of *D. speciosum* var. *curvicaule* 'Daylight Moon' x self at the Kempsey weekend, named *D. speciosum* 'Clair de Lune'. The selfing was made in 1997 and flowered first in 2007. It is now a large specimen plant which occupied a space of 1.4 x 1.1 metres. and had more than 25 leafed canes about 42 cm long, and unblemished leaves of a similar length. The racemes were arching with 90-110 pale cream flowers, averaging around 50 mm x 43 mm displayed on arching stems all around the plant. Flowers were very uniform in size with excellent shape, substance and presentation, the highest quality *D. speciosum* I have seen. It received 90.3 points, placing it in the high FCC range, and also an FCC level cultural award.

Congratulations to Tony for a tremendous effort to grow and flower such a spectacular specimen, which received the highest award ever given by an ANOS panel. (additional photo see page 3)



D. speciosum 'Clair de Lune', photo Bill Dobson.

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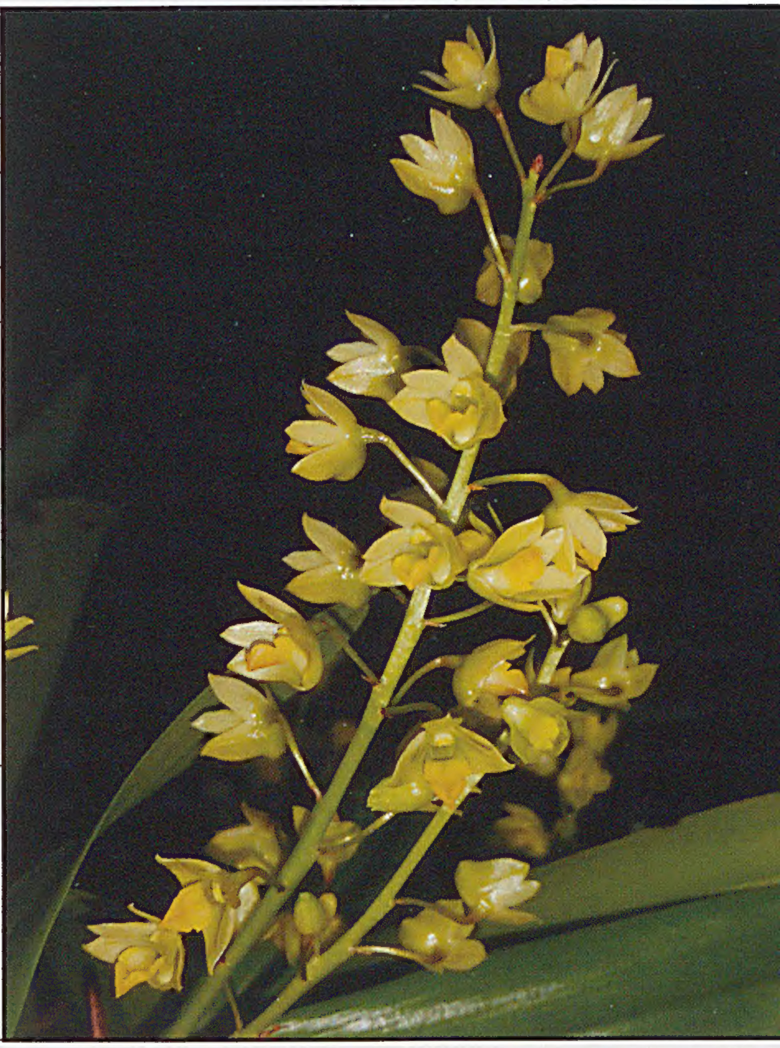
ANOS Awards

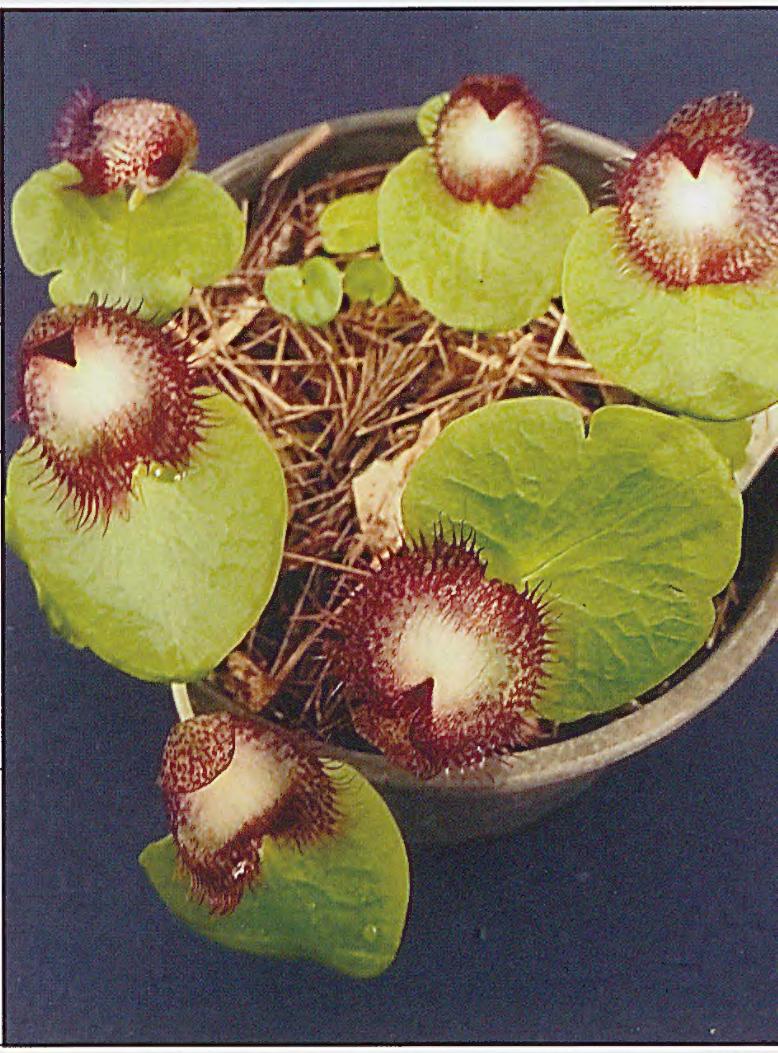
#267 - 268 *Dendrobium monophyllum* 'Yellow' AM-ACC/ANOS 2016 (NSW)

Points	82.2 (ACC 80.8)
Owner	Don Roberts
Date	22 Oct 2016
Event	
Photos by	
Number of:	
flowers	198 & 4 buds
inflorescences	10
Measurements(mm):	
flower across	10.5
vertical	12
petal	8L 2.8W
sepal	8L 4.5W
dorsal	6.8L 3.4W
labellum	6.7L 4.3W
inflorescence length	96
Detailed avge points:	
shape(25)	20.8
colour(20)	15.7
size(15)	11.3
substance/texture(10)	8.0
floriferousness(15)	13.2
habit/attractive(15)	13.2



#269 *Corybas hispidus* 'Rosemaree' ACC/ANOS 2017 (NSW)

Points	79.4
Owner	Terry Cooke
Date	13 May 2017
Event	MacArthur Autumn Show
Photos by	Terry Cooke
Number of:	
flowers	6
inflorescences	6
Measurements(mm):	
flower across	25.4
vertical	23.8
petal	3.7L 2W
sepal	2L 1W
dorsal	23.2L 9.8W
labellum	21L 25.4W
inflorescence length	5
Detailed avge points:	n/a
shape(25)	
colour(20)	
size(15)	
substance/texture(10)	
floriferousness(15)	
habit/attractive(15)	



Shows and Events

- **ANOS Illawarra Late Spring Show**
  Weekend of 14-15 October 2017 Old Courthouse, Cliff Road, Wollongong 2500., 9am to 4pm both days.
- **Central Coast Spring Show**
  14th -15th October 2017, 9am to 4pm, Narara Valley Nursery, 2 Manns Rd, Narara NSW
- **Revesby Workers' Native Orchid Show**
  Saturday 14th October – Main Building Revesby Workers Club, 2B Brett St, Revesby NSW
- **ANOS Sydney Group Sarcochilus Show**
  Saturday 21st October 2017, Kellyville Village, 92A Wrights Road, Kellyville 9.00am - 4.00 pm
- **ANOS Newcastle Sarcochilus Show**
  Weekend of 21st to 22nd October 2017, 10am - 4pm. Windale - Gateshead Bowling Club, 2A Lake St., Windale NSW
- **ANOS Macarthur and District Late Spring Show**
  Saturday 28th October 2017, Oran Park Town Centre, 351 Oran Park Dr., Oran Park NSW
- **ANOS Geelong Group Annual Show**
  Saturday 4th November 2017, Wesley Uniting Church Hall, 100 Yarra St. Geelong VIC

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Directory of ANOS Groups (and Associated Societies)

NEW SOUTH WALES

- **ANOS Central Coast**; PO Box 3010, Erina NSW 2250 - Neville Lee (02)4340 5157 2nd Wednesday each month, 8pm. Narara Community Centre, 2 Pandala Rd, Narara 2250
- **ANOS Far North Coast Inc.**: 2 Treelands Cres, Ballina, NSW 2478 - Keith Skaines (02)6686 6303 3rd Saturday of month (except Dec. & Jan.), 2pm various venues, contact the secretary.
- **ANOS Illawarra**: 2 Wilford St, Corrimal NSW 2518 - Bruce Porter (02)4284 8308 2nd Tuesday each month, 7pm. Old Court House, Wollongong.
- **ANOS Macarthur and District**: 8A Boundary Rd., Parramatta NSW 2150 - Wally Southwell (02) 4681 8589 3rd Thursday each month, 8pm. Birriwa Community Hall, Fitzpatrick Rd, Mt Annan.
- **ANOS Mid-North Coast**: 69 The Lakes Way, Forster NSW 2428 - John Zietsch (02)6554 9733 3rd Sunday each month, 12 noon, followed by BBQ. Contact for location - Taree or Wauchope
- **ANOS Newcastle Inc.**: PO Box 4021, Rathmines NSW 2283 - Peter Denning (02)4975 3729 4th Thursday of month, 7.30pm. Elermore Vale Community Centre, Croudace St, Elermore Vale.
- **ANOS Sydney Inc.**: 9 Alicia St, Glenwood NSW 2768 - Andrew Locke (02)8824 6338 3rd Friday each month, 8pm. Senior Citizens Hall, B.H. Community Centre, Conie Ave, Baulkham Hills.
- **ANOS Warringah Inc.**: PO Box 421, Forestville NSW 2087 - Bill Dobson (02)9981 2525 3rd Tuesday each month, 8pm. Community Hall, Starkey St, Forestville.

QUEENSLAND

- **ANOS Beenleigh Inc.**: PO Box 1130, Beenleigh QLD 4207 - David Cleal (07)3805 6865 1st Thursday each month, 7.30pm. Showground Hall, James St, Beenleigh
- **ANOS Kabi Inc.**: PO Box 424, Aspley QLD 4034 - David James (07) 3359 5752 2nd Tuesday of month except Jan., 7.30pm. Isabella Griffin Room, Strathpine Community Centre, 199 Gympie Road, Strathpine.
- **ANOS Mackay and District**: 24 Barton St, Mackay, QLD - Arthur Pinkney (07)4952 2186 2nd Thursday each month, Andergrove Community Centre, Celeber Drive, Andergrove.
- **ANOS Townsville Inc.**: 92 Curie St, Wulguru QLD 4811 - John Nuss (07)4778 4311 1st Tuesday monthly (excl. Jan.) 8pm Townsville O.S. Hall, Joe Kirwan Pk, cnr Bamford Lane & Charles St, Townsville
- **Native Orchid Society of Toowoomba Inc.** 106 Umbiram Rd, Wyreema QLD 4352 - Josie Wright (07)4696 2150 1st Friday of month, 7.30pm Lutheran Church Hall, cnr West and Alderley St, Toowoomba

SOUTH AUSTRALIA

- **Native Orchid Society of South Australia Inc.**: PO Box 565 Unley SA 5061 - Les Nesbitt (08) 8261 1550 4th Tuesday each month, 8pm. St Matthew's Hall, 67 Bridge St, Kensington.

VICTORIA

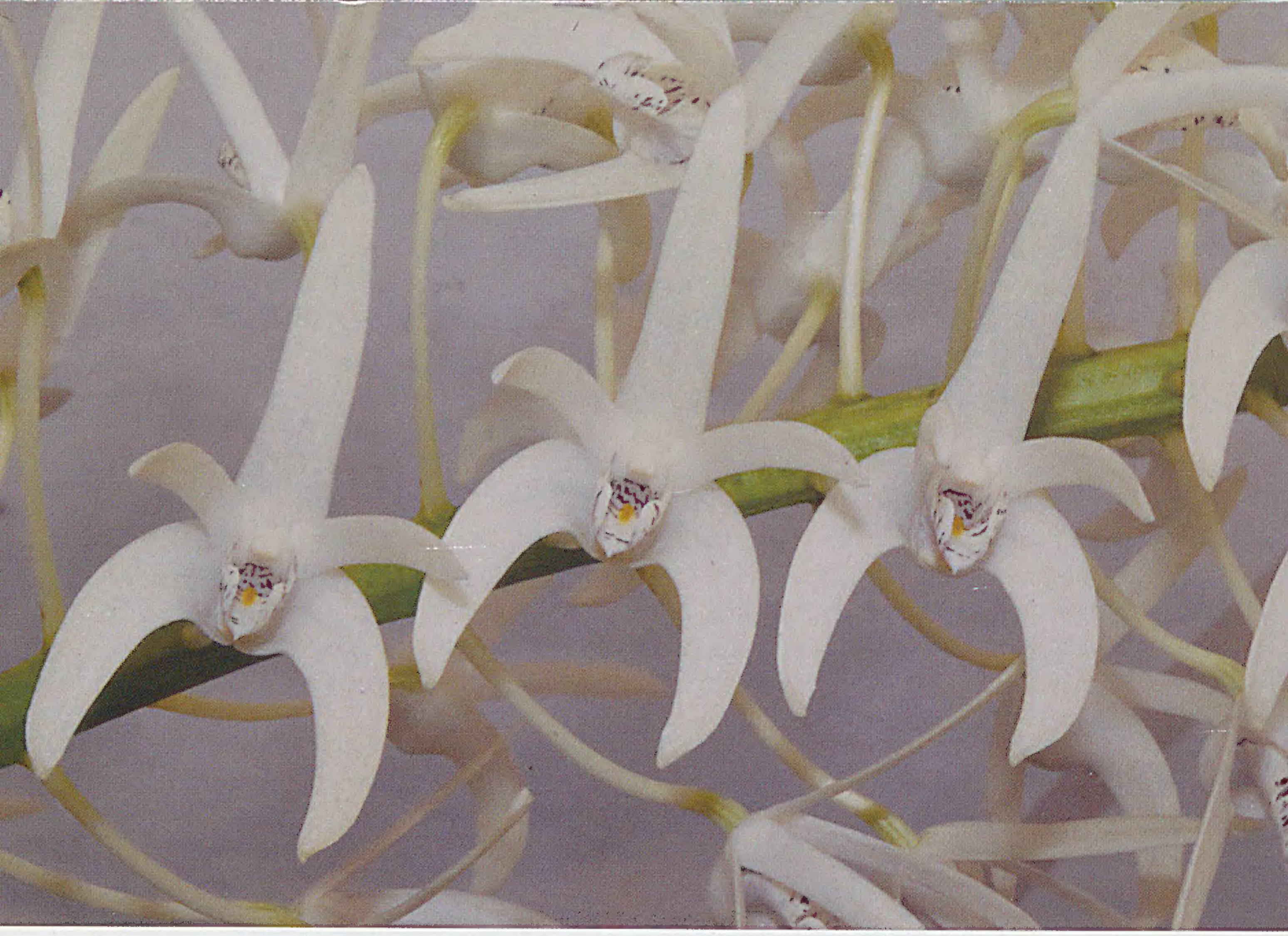
- **ANOS Geelong Inc.**: 609 South Street, Ballarat VIC 3350 - Anita Hinton (03) 9743 6040 2nd Wednesday each month, 7.30pm. Uniting Church Hall, Yarra St, Geelong.
- **ANOS Melbourne Suburbs Inc.**: PO Box 169, Bayswater VIC 3153 - Phil Ritchie (03) 9525 9606 4th Wednesday of month (excl. Dec. & Jan.), 7.30pm. Montrose Primary School, Leith Rd, Montrose 3765
- **ANOS Victoria Inc.**: PO Box 308, Boronia VIC 3155 - (03)9387 2771 1st Friday each month, 8pm. Toorak Uniting Church Hall, , 603 Toorak Rd, Toorak.

WESTERN AUSTRALIA

- **ANOS Western Australia Inc.**: Mrs Lyn Morgan, 99 Bywater Way, Wilson WA 6107 - (08)9451 2164 2nd Monday each month, 8pm. Wilson Community Hall, Braibrise Rd, Wilson.

NEW ZEALAND

- **ANOS New Zealand Native Orchid Group** 42 Titiro Moanna Rd, Korokoro, Lower Hutt 5012



Exhibits at the Kempsey Speciosum Spectacular 2017, by Ted and Winsome Walmsley.
Above: *Den. speciosum* var. *speciosum* 'Mark', photo Peter Adams.
Below: *Den. speciosum* var. *grandiflorum* 'Will's Gold', photo Peter Adams.